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ABSTRACT

The acquisition of major defense systems has become a matter of concern to the Congress of the United States and in the eyes of the nation's populace as a whole.

As in any major research and development effort, both in the Department of Defense and in civilian industry, early planning and sound decision-making at the inception of a program are key to the future success of the program.

The responsibilities and roles of the Service Components and the Office of the Secretary of Defense in the initiation of defense system acquisition must be clearly defined and well coordinated if the early planning and decision-making are to be sound and effective. Current DOD policies are tending toward clearer definition of these responsibilities and roles, but there are still improvements which should be made.

This thesis reviews the history of management of defense system acquisition, presents the current procedures and practices employed in program initiation, and concludes with specific suggestions for streamlining certain aspects of the system acquisition process which pertain to the initiation of a major defense system acquisition.

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I. INTRODUCTION

As graduate students in the first class of the Navy's recently established Systems Acquisition Management curriculum at the Naval Postgraduate School, the authors have been given an in-depth exposure to methods and policies currently employed by the Department of Defense in the acquisition of defense systems. An appreciation was gained of the importance of sound decision-making at the program initiation stage of a new defense system acquisition. The analysis, judgements, and recommendations upon which this first Secretary of Defense decision is based greatly determine the soundness of this decision.

The worthwhileness of these analyses, judgements, and recommendations is predicted, in a large part, upon the amount and form of the interfaces between the Office of the Secretary of Defense (OSD) and the Service Components (Army, Navy, and Air Force).

A. REASON FOR THESIS

The gradual change in national priorities towards domestic issues dictates an increasing need for the efficient usage of economic resources within the Department of Defense. "...this marks the first time in American history that the defense budget, after or during a war, has returned to its pre-war levels in real terms" (Ref. 1, p. ix). Congressional interest in defense systems acquisition is

intense, so intense that in 1970 the Blue Ribbon Defense Panel, in its Staff Report on Major Weapon Systems Acquisition Process, drew the conclusion "...that Congress is fast replacing OSD as the predominate influence upon major programs" (Ref. 2, Appendix E, p. 38). Congressional scrutinizers of defense budgets probe deeply and are challenging the rationale and justification for decisions made within the Department of Defense.

During his tenure as Deputy Secretary of Defense, Mr. David Packard instituted several management procedures which were major departures from the practices followed by Mr. Robert McNamara and Mr. Clark Clifford, Secretaries of Defense during the Kennedy and Johnson administrations. A significant change was the establishment of a Defense Systems Acquisition Review Council (DSARC). Although the original intent of forming the DSARC was that it would be a temporary group, present indications are that it will be continued indefinitely.

In this thesis the authors examine the procedures by which a new major defense system acquisition is initiated. A review of past practices in defense system acquisition management provides a backdrop for the discussion of current practices and finally, the authors propose suggestions of ways to streamline and make more effective the interface between OSD and the Service Components in the initiation of a defense system acquisition.

B. APPROACH USED

Pertinent literature on the subject of the Development Concept Paper and the Defense Systems Acquisition Review Council process was assembled and subjected to extensive study and analysis. To gain insight to current views and problems, the authors spent a week in Washington, D.C., conducting personal interviews with personnel in the offices of the Secretary of Defense and the Service Components, all of whom were closely associated with the DCP/DSARC process. In addition, the authors interviewed Mr. David Packard in October 1972 to obtain his personal insights.

C. ACKNOWLEDGEMENT

The authors wish to express their gratitude to the numerous individuals in OSD and in the Service Components who so willingly gave of their time to provide personal insights into the DCP/DSARC process in the initiation of a defense system acquisition. In particular, acknowledgement is make to Mr. David Packard, former Deputy Secretary of Defense; Mr. Edward Ball and Mr. Elliot Harwood of the Office of Director, Defense Research and Engineering; VADM Eli Reich, USN, Deputy Assistant Secretary of Defense (Production Engineering and Material Acquisition); CDR Raymond Youmans, USN, Office of Undersecretary of the Navy; Dr. Peter Waterman, Office of Assistant Secretary of the Navy; and Mr. John Tyler, Office, Chief of Staff Army.

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II. BACKGROUND OF MAJOR DEFENSE SYSTEMS ACQUISITION MANAGEMENT

A. GENERAL HISTORY

Defense systems acquisition management today reflects two decades of effort to introduce techniques which are capable of meeting the urgent demands of complex modern defense systems. A moratorium from arms competition like that of previous post-war periods did not occur after World War II. Because of the actions of the Soviet Union on the international front and to maintain its national security and to fulfill its global commitments, the United States was compelled to seek more and more powerful weapons (Ref. 3, p. 1). This need further resulted in the ever increasing complexity of new weapons as they were introduced into the arsenal. In his final message to the Nation in January 1961, President Eisenhower pointed to this need when he said, "Our arms must be mighty, ready for instant action, so that no potential aggressor may be tempted to risk his own destruction" (Ref. 4).

In the face of these grim circumstances, radical changes took place in weapons technology. No comparable technological revolution in weapons had ever occurred before (Ref. 5, p. 7). From this technology came families of nuclear weapons as well as nuclear powered submarines and surface ships. Military research and development activities developed jet

and rocket engines, supersonic war planes, missiles and satellites, along with complex electronic launching, guidance, and control systems.

The increased research and development efforts of the military services and their contractors produced weapons of awesome complexity. Inherently, the resultant advanced systems grew more complex with each step forward in technology. With each of these advances in technology, the cost in terms of time, material, money and manpower increased to the point that today a significant part of the defense budget is committed to the acquisition of major defense systems. Although the dollar amount of the defense budget appears to be increasing each year, the actual buying power of these monies is actually decreasing which makes the need for sound decision-making and management in defense systems acquisition as great, if not greater, than it has been in prior years.

The need for better defense system management also demanded a more efficient process for selecting systems to be developed and produced. Defense systems normally evolve either as a result of continuing research and development efforts of the military services and defense contractors or through further engineering development of systems already in being. At some point, before formal system management can begin, the decision must be made to develop and produce a new system. In addition to military needs both

technical and economic considerations are involved in this decision.

In order to better understand the organization that has evolved in the Department of Defense for dealing with this important function of system development and acquisition, it is helpful to review the history of its growth. Prior to World War II, the research and development activities of the Army and Navy were at an extremely low level of effort with no top level organization to coordinate the programs of the two departments. This situation was probably an important factor in the creation in June 1940 of the National Defense Research Committee (NDRC), a civilian organization with authority to initiate, and with funds to support, research and development directed at creating new weapons (Ref. 6, p. 105).

The establishment of NDRC was a constructive and essential step toward an immediate and effective application of science and technology to the art of warfare. Since World War I, because of limited funds, the military services had done little toward applying science and technology to warfare and weaponry. However, in this same period the scientific progress of our country had developed enormously. Increasing numbers of universities engaged in research in the physical sciences with a corresponding increase in our nation's contribution to scientific knowledge. Industry had similarily created a dynamic technology directed at

applying the new knowledge of science to the civilian life and economy.

In 1941, the NDRC was replaced by the Office of Scientific Research and Development (OSRD). This organization was the top authority and operating agency of the civilian scientific and technologic effort. OSRD's general functions were to advise the President about the status of scientific research relating to national defense and measures necessary to assure continued and increasing progress in this field. It had authority and funds, it could initiate research leading to weapons, and it could carry the development to the stage of operating models which were tested and evaluated by the War and Navy Departments. These Departments were the final judges of the military value of the new developments. Those which the departments considered of adequate military value were standardized and contracts were let for their production. Most of the research projects that OSRD sponsored and supported were undertaken at the request of the Army or Navy.

During World War II, the Army and Navy rapidly expanded their own organizations for research and development. In addition to their role of decision-making on programs initiated by the OSRD, the two services initiated their own programs which were largely carried out in the laboratories and facilities of industry.

In the five year period from 1940 to 1945, the Nation's expenditures for defense research and development expanded

from a modest $30 million to approximately $600 million. While at the time this increase may have appeared to be excessive, R&D accounted for a mere .4% of the total national defense spending of $152.7 billion in FY 1945 (constant CY 1958 prices) (Ref. 1, p. ii). However, due to this rapid expansion of military R&D and the existence of war conditions, little attention was given to efficiency and economy. With the rapid and general demobilization of the Armed Forces in 1946, OSRD was discontinued and the programs under its cognizance were assigned to the Army and Navy as appropriate.

The disbanding of OSRD at the end of World War II created a void in the relationship between the military and scientific communities and posed the problem of improving military R&D coordination between the Army and Navy. In June 1946, as an outgrowth of a joint committee study proposed by Navy Secretary James V. Forrestal, a Joint Research and Development Board (JRDB) was established. This board was the first organizational body fully authorized to act as a "command" agency on research and development matters common to both services (Ref. 6, p. 35).

The National Security Act of 1947 created the National Military Establishment which included the Department of the Air Force. It also established the basic mechanisms for more centralization of R&D control at the newly established Secretary of Defense level. The Secretary of Defense was given broad responsibility for effecting coordination of

certain activities of the military departments which among others included the elimination of unnecessary duplication in a number of areas, including research and development.

The National Security Act of 1947 replaced the Joint Research and Development Board with the Research and Development Board (RDB) which was to be the vehicle by which the Secretary of Defense would oversee all military R&D. The RDB was tasked with several significant functions: developing a master annual R&D plan; providing guidance to the military departments in formulating their programs to implement the plan; continuously reviewing and analyzing R&D facilities; making budget recommendations for the defense R&D program as a whole; and assigning to one service component the primary responsibility for an entire R&D program when unnecessary duplication could be eliminated, efficiency promoted or economy achieved (Ref. 5, p. 36).

The 1949 Amendment to the National Security Act increased the power of the RDB by giving it the authority to coordinate R&D rather than merely recommend such coordination and it provided the Board Chairman with the power of decision-making on matters which fell within the jurisdiction of the Board.

The Board functioned through committees of military men and civilians. Each committee focused on a special area, e.g. electronics, aeronautics, and had panels to deal with more specific areas of interest. The effectiveness of the RDB suffered from the inherent weaknesses of the

committee approach. The committees frequently tended to involve themselves with problems faced by counterpart groups within the military services. Despite deficiencies, the RDB during its six years of existence, accomplished a considerable degree of coordination, exchange of information among the services and industry, and eliminated some of the duplication which previously existed in defense R&D. These accomplishments were a significant move in the direction of more effective management of R&D in the Department of Defense.

With the reorganization of the Defense Department in 1953, an Assistant Secretary of Defense for Research and Development replaced the Research and Development Board. The duties of this Assistant Secretary in brief were:

1. To advise the Secretary of Defense on the research and development aspects of the Department of Defense policies, programs, and plans including capital and operating budgets.

2. To assure that there was a sound and integrated R&D program in the Defense Department.

3. To ensure that the R&D program was geared closely to current strategy, which meant close contact with the Joint Chiefs of Staff for close coordination with all Government and non-government organizations on all R&D that might affect national defense.

The service components were responsible to this executive for the planning and execution of R&D programs with his

primary function being that of review to ensure that the service plans and activities were conducted in an overall coordinated, sound, and integrated manner. The 1953 legislation also created the position of Assistant Secretary of Defense (Applications Engineering). This executive was charged with preparing DOD policies and procedures to assure that military weapons systems would meet the objectives of "application engineering" as they passed from research and development into production. The lack of clear lines of responsibility between the functions of the two assistant secretaries reduced the effectiveness of each. This situation continued to exist, despite several attempts to resolve the confusion, until 1957 when their functions were merged into the single position of Assistant Secretary of Defense for Research and Development.

The next reorganization of the Department of Defense came about in 1958. This act increased the importance and status of the top defense D&R manager. The Assistant Secretary was renamed Director of Defense Research and Engineering (DDR&E) and ranked sixth in the Defense Department after the Secretary, his Deputy and the three Service Secretaries. He became the principle advisor to the Secretary of Defense on matters of science and technology. He also supervised all R&D activities within DOD, including their direction and control through centralized management. In these areas, DDR&E recommended policies and guidance on DOD planning and program development and on programs to fill gaps and to meet

national objectives. The office of DDR&E has continued as a prime mover of R&D within the Department of Defense.

Actual control of defense R&D has varied in recent years depending largely upon the management style of the Secretary of Defense. The two somewhat different approaches of McNamara and the Laird/Packard team are presented in detail in the following sections.

B. MCNAMARA APPROACH

When Robert S. McNamara became the Secretary of Defense in January 1961, President Kennedy charged him with determining the level of forces required and insuring the support of those forces at the least cost (Ref. 7, p. 108). With this mandate from the President, Mr. McNamara conducted a detailed evaluation of the numerous activities of the Department of Defense and of his position as the top manager of the Department. As a result of this evaluation he surmised "...that the principal problem standing in the way of efficient management of the Department's resources was not the lack of management authority - the National Security Act provides the Secretary of Defense a full measure of power - but rather the absence of the essential management tools needed to make sound decisions on the really crucial issues of national security" (Ref. 8, p. 193).

As for the manner of management he was to employ as Secretary of Defense, Mr. McNamara stated:

> "...it became clear that either of two broad philosophies of management could be followed by a Secretary of Defense. He could play an essentially passive role - a

judicial role. In this role the Secretary would make the decisions required of him by law by approving recommendations made to him. On the other hand, the Secretary of Defense could play an active role providing aggressive leadership - questioning, suggesting alternatives, proposing objectives, and stimulating progress. This active role represents my own philosophy of management...I became convinced that there was room for and need of this kind of management philosophy in the Department of Defense." (Ref. 9, p. 2).

Mr. McNamara was determined to be an activist leader and not merely the judge of competing alternatives or a negotiator among competing interest groups. In order to perform in this manner, McNamara believed that he would need readily at hand all of the relevant information available for the making of sound decisions and for controlling their execution.

"Among the crucial decisions confronting the Secretary of Defense...are the choices of major military forces and weapons systems needed to carry out the tasks and missions which derive from our national security objectives. Accordingly, the pertinent information must be so organized as to focus directly on those forces and weapons systems. One must know the military effectiveness and the cost (of a particular weapons system) including all associated equipment, personnel, supplies, facilities and funds, regardless of the particular service to which the force element may be assigned. And in order to optimize the allocation of resources, one needs not only the cost of equipping these units (weapons procurement cost) but also the cost of manning and operating them for at least a reasonable period of years into the future (life cycle costs)" (Ref. 8, p. 193).

In keeping with his philosophy of management and to provide the information he considered necessary for good decision-making, Mr. McNamara instituted several changes in the Department of Defense which were received with mixed emotions by OSD officials and members of the DOD components.

Among these changes was the introduction of the Planning-Programming-Budgeting System (PPBS). This system was designed to provide the information in a form desired and to integrate it into a single, coherent management system. In the words of Mr. McNamara,

"...this system serves several very important purposes:

1. It produces the annual Five-Year Defense Program which is perhaps the most important single management tool for the Secretary of Defense and the basis for the annual proposal to the Congress.

2. It provides the mechanism through which financial budgets, weapons programs, force requirements, military strategy, and foreign policy objectives are all brought into balance with one another.

3. It permits the top management of the Defense Department, the President, and the Congress to focus their attention on the tasks and missions related to our national security objectives, rather than on the tasks and missions of a particular service.

4. It provides for the entire Defense Establishment a single "approved" plan, projected far enough into the future to ensure that all of the programs are both physically and financially feasible" (Ref. 8, p. 104).

The main elements of the PPBS were the program packages, the Five-Year Defense Program, and the use of cost-effectiveness studies. With the possible exception of the five-year program concept, these elements were not in themselves unique. The distinctive feature of the program packages was that they focused on broad functional areas such as strategic forces, continental-defense forces, and general-purpose forces, rather than on the traditional service categories. The Army had previously studied such an approach and the Air Force and the Navy had already developed

functional programs for their own use. The services had also instituted, to a limited extent, the use of operations research and systems analysis techniques. The really innovative feature of the PPBS was that the Secretary elected to make the functional programs major vehicles for his decisions. The Five-Year Program focused on functional categories that were broader than the responsibilities of any single military service or department and thus tended to shift the initiative to the Secretary.

In short, the PPBS was intended to achieve unification of effort within DOD without causing drastic changes of the entire organizational structure.

To augment the PPBS, Mr. McNamara also instituted a means of analytical support which operations research and other modern management techniques could provide on matters of national security. This analytical support was called systems analysis. The Office of Systems Analysis was initially a unit within the Office of the Comptroller, closely associated with PPBS. In 1965, Systems Analysis was elevated into a separate entity with its director becoming an Assistant Secretary of Defense. The military services could see that McNamara was effecting important changes in the department quickly, and, like most long-established organizations, they were not completely receptive to these sudden changes. The rapid rise of Systems Analysis to a special status was indication of its pre-eminent role in the McNamara administration.

In brief, systems analysis takes a complex problem and sorts out the "jumble" of pertinent factors. The aim is "to assist the decision maker by providing him with quantitative estimates of the effectiveness and costs of each of the alternative courses which he could choose" (Ref. 9, p. 15). What proved to be the most controversial feature of the new system was the extensive use of systems analysis techniques to review and evaluate the force proposals of the JCS and the Service Components on a substantive as well as a budgetary basis.

The combination of Mr. McNamara's management style of being personally involved in all activities of DOD, the introduction of PPBS, and the emphasis on the systems analysis approach to decision-making resulted in greater centralization of power at the OSD level for defense system acquisition decisions. The military components felt "threatened" by the "whiz kids" approach of systems analysis which often placed quantitative calculations above "experience" in the decision-making process.

In the area of defense system procurement, Mr. McNamara found that a special characteristic of defense research and development was the diversity and large number of separately identifiable tasks and projects encompassed within R&D. In order to "organize" these tasks and projects, they were grouped into categories which would be meaningful from a management standpoint. The approach used was based, in a general sense, on the phases of the

evolutionary process by which ideas were eventually translated into operational military hardware. The categories selected were: Research, Exploratory Development, Advanced Development, Engineering Development, and Operational Systems Development. Although these terms had been used previously, they were redefined.

"Research" constituted the effort directed toward the deeper understanding of natural phenomena and the environment, i.e. toward the solution of basic problems, relevant to long-term national security, in the physical, chemical, biological, engineering, behavioral, and social sciences. Individual research tasks were derived from analyses of the basic needs and limits in defense technology, and from a selection of the scientific opportunities relevant to national security in future years.

"Exploratory Development" constituted the effort directed toward the application of research results, and the development of materials, components, devices and subsystems useful to new military weapons and equipment. The emphasis of this category was on exploring the feasibility of various approaches to the solution of specific military problems.

"Advanced Development" encompassed the efforts directed toward producing experimental hardware for feasibility testing in order to determine its suitability for military use before proceeding with the design and engineering for actual service use. As programs moved into this stage,

they could begin to be identified with specific military applications or techniques and could, therefore, be analyzed in depth as to their potential military usefulness. It was also in this phase that analysis into initial cost estimates were made to determine whether the potential operational benefit would be worth the cost of further development, production and deployment.

"Engineering Development" encompassed the efforts directed toward designing defense systems or equipment specifically engineered for service use and it was in this phase that large commitments of resources may have been made to a single project. Accordingly, before a system was placed into full-scale engineering development, it was necessary to determine its specific operational requirements and compare its relative cost-effectiveness with that of other available alternatives. It was in this phase that firm goals, milestones, and time schedules were established.

"Operational Systems Development" encompassed the efforts directed toward the development, test, evaluation and design improvement of defense systems or equipment which had been approved for production and deployment. Once a decision had been made to proceed with production and deployment, the project was included in the appropriate mission-oriented program in PPBS.

Because Research and Exploratory Development involve the search for new knowledge and techniques, specific goals,

milestones and time schedules were not normally prescribed. Accordingly, management of these categories of R&D was on a "level of effort" basis. Decisions about specific tasks and projects was virtually impossible from a central vantage point and therefore reliance was placed on the military service R&D managers for ensuring that the prescribed level of resources was concentrated on the most promising projects.

Mr. McNamara believed that it was "...extremely important that no new major systems development be started until the basic components and technology were in hand" (Ref. 8, p. 152). This was one of the principal purposes of Advanced Development. In this phase many of the major components of new systems were developed and experimental prototypes were also developed prior to commitment to Engineering Development.

Projects in the Advanced Development phase were managed on a line item basis. Each project of significance was individually reviewed in OSD and individually managed by one of the services or defense agencies.

While Research and Exploratory Development were not directly related to immediate military requirements, a full-scale Engineering or Operational Systems Development could only be justified in terms of its potential contribution to national defense strategy, considering both its cost and its military effectiveness, as well as the cost and effectiveness of any other available alternatives. Mr. McNamara maintained that too many projects were moved into Systems

Development work before adequate consideration had been given to how the proposed defense system would be employed, what it would cost, and whether its contribution to military capability was worth the cost. In several cases, the capability of a proposed new development could have been achieved in other ways, often by the modification or more imaginative use of an existing defense system.

In the words of Mr. McNamara, "...in planning the R&D program, we must consistently focus our attention on the new or improved capabilities that are required, and not just on the vehicles. If these capabilities can be proved through the modification of existing vehicles or by the development and installation of new equipment, there is no reason why we should incur the additional cost of developing new vehicles" (Ref. 8, p. 155).

Before a system was moved into Engineering Development it was necessary to determine as precisely as possible the following elements: threat, operating capabilities needed, alternative ways of meeting the threat, size of the forces proposed, time schedule, and probable cost of each alternative. To facilitate the determination and coordination of these elements, McNamara instituted the Development Concept Paper (DCP). The DCP is discussed in detail in Section III of this thesis.

Through the use of these categories and the varying management techniques employed for each category, Mr. McNamara felt that he was "...able to minimize the initiation

of unpromising programs and to eliminate in a more timely manner those which are revealed to be unpromising or unneeded as the development process unfolds" (Ref. 8, p. 156).

C. LAIRD/PACKARD APPROACH

In January 1969, President Nixon appointed Mr. Melvin R. Laird as Secretary of Defense and Mr. David Packard as Deputy Secretary of Defense. Mr. Laird came into the Pentagon with some very definite views on how the defense establishment should be operated, views formulated in the sixteen years he was in Congress as a member of the House Appropriations Committee and a vocal critic of DOD management during McNamara's term as Secretary of Defense. Similarly, Mr. Packard brought into OSD his ideas of how an organization as large as the Defense Department should be managed. These ideas were based on his successful experience as one of the nation's leading industrialists.

The views and ideas of these two top DOD executives were alike on many questions of defense policy but Mr. Laird, as had been the case with Mr. McNamara and his successor Mr. Clark Clifford, became embroiled in the Vietnam issue and other high level matters of national security and strategy. Accordingly, his deputy was given the role as the central figure in articulating and implementing the changes they believed necessary for improving and streamlining the functioning of the Defense Department. In the area of defense system acquisition, Mr. Packard stated that "at the outset of this administration it became clear that

there were many problems associated with weapon system acquisition and that this area needed improvement" (Ref. 10) (Appendix A).

Although this need for improvement was recognized early by Mr. Packard, he chose to move somewhat slowly in order that he might be able to survey the situation before taking any action. He expressed a desire to experiment with and try out on a limited basis any new practices and procedures. Based on the experiences gained during this "trial period" he established new policies or made modifications to existing policies rather than take sweeping changes throughout the Department of Defense.

One of Mr. Packard's primary functions as Deputy Secretary of Defense was in overseeing the acquisition of new defense systems by assuring that the systems procured were properly conceived, that they were absolutely necessary to our national defense needs, and that when employed into the field, they met the established requirements.

To achieve these goals in defense procurement, the Laird-Packard philosophy involved what Secretary Laird called "participatory management." Mr. Packard stated, "... decisions are likely to be better, and to be implemented better, if those responsible for the implementation are allowed to participate in making them" (Ref. 11, p. 26). This concept of involving those ultimately responsible for implementation in the formulation of plans and policies was promulgated in Secretary Packard's memorandum of 28 May 1970,

"Policy Guidance on Major Weapon System Acquisition." In this memorandum, he stated that the services, those who actually implement the programs, would be the ones who must assume the majority of the responsibility of implementation.

Secretary Laird reemphasized this decentralization approach to management in his statement before the Senate Armed Forces Committee in March 1971 when he said:

> "We have adopted a concept of management that is based on participatory decision-making.... Our aim is to improve both the decision-making process and also other management activities by placing more emphasis on people and less emphasis on elaborate procedures. When the people who will be responsible for implementing a decision have the opportunity to participate in making it, the decision is likely to be better, and the people in the organization will probably have a greater incentive for successful implementation" (Ref. 12, p. 113).

To facilitate implementation of this concept, the PPBS cycle was altered so that the military services and the Joint Chiefs of Staff had a major role in the planning of force structures. Also the Systems Analysis office in OSD was placed in the position of reviewer of military plans and proposals, rather than initiator of plans as in the McNamara era.

In his testimony before the Senate Armed Forces Committee, Mr. Laird stated:

> "In the previous administration, the decision-making process was centrally controlled, with the Systems Analysis office giving independent support to the Secretary of Defense by identifying issues, providing analyses, and recommending decisions. In this administration, we have encouraged greater participation by all parties concerned ...we have sought to identify more precisely the areas of responsibility of the participants... the role of Systems Analysis is to stimulate and develop the uses of analytic

techniques throughout the Department and to encourage the development...of clear analysis of issues and clear delineation of alternative courses of action on them. In this manner the issues and alternatives are clarified not only by analysis but also by the judgement and recommendations of the military services and of the JCS.

"We have taken steps to define responsibilities more precisely, and we believe this...will contribute to better management. This had been done in the planning, programming and budgeting system (PPBS), where we have given the Military Departments more responsibility and, at the same time, provided a clearer definition of Service and OSD responsibilities. We have gone through the same process in establishing procedures to be used in the development and acquisition of new weapons" (Ref. 13, p. 115).

The responsibility of OSD in the acquisition of new weapons, according to Mr. Packard, consists of approving policies, providing broad guidance to the services, evaluation of how well the services are performing their R&D functions, and, finally, the decision-making responsibility for determining if a particular program should be implemented at various decision points in the acquisition. This latter function was retained at the OSD level because of its direct relationship to the overall long-term objectives and budget constraints of the Department of Defense.

In July 1970, The President's Blue Ribbon Defense Panel issued its findings and recommendations on the operation of the Department of Defense. The Panel noted that DOD policy on weapons acquisition called for a single major decision by the Secretary of Defense. This single decision constituted authorization for the commencement of a major system development. Although this policy had served the intended purpose of giving the Secretary greater control over the

start of new programs, it did have serious shortcomings. Some of these shortcomings were:

1. Because it was so difficult for a service to obtain the decision to proceed, there was a tendency not to review the decision once it had been made. This resulted in a lack of meaningful review of the system during the stages of development.

2. The single decision point led to a greatly increased amount of justification which forced the services to concentrate more on studies to justify the system rather than on the technical development of critical components of the system.

3. The environment in which approvals were obtained caused the services and their contractors to make genuine, but frequently over-optimistic estimates of their ability to deal with the technical unknowns. This trend often resulted in overruns in cost and schedule later in the development, and in some instances deficient hardware.

4. The nature of the decision inhibited future innovations once the system had been approved for development because any future changes would challenge the credibility of the original decision. (Ref. 2, p. 13).

The Panel concluded that the single decision point concept was not a viable management mechanism and recommended that a multi-decision management system be utilized. Three decision points were cited where the services should

be required to obtain Secretary of Defense approval before proceeding to the next phase of the acquisition.

Mr. Packard agreed with this recommendation of the Blue Ribbon Panel. The vehicles by which the Secretary of Defense and his Deputy would be informed on matters of major defense system acquisition were the Development Concept Paper (DCP) and the newly established Defense System Acquisition Review Council (DSARC). Implementation of these concepts came through promulgation of Department of Defense Directive 5000.1, "Acquisition of Major Defense Systems" (Appendix B). The DCP and DSARC process is discussed in ensuing sections.

III. SYSTEM LIFE CYCLE*

For any defense system there exists a basic life cycle. The system life cycle may be said to originate in the perception of a need and to terminate when the system is retired as obsolete.

The life cycle may be originated in one of two ways, first as an outgrowth of a new need or, second, as an iteration of a previous system whose life cycle is nearing completion. This latter system, to a large extent, satisfies an increased need (or perhaps the original need better), whereas the new system fulfills a need which may not have previously existed, possibly as the result of a new scientific or technological breakthrough.

In the ensuing discussion of this system life cycle, a "user-producer" viewpoint will be adopted. The system life cycle is viewed as a group of activities which are of interest and concern to the user of the system and to the producer of the system. The user's functions entail stating and developing the needs and concepts for the system and after production, for the operational use and support of

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*Acknowledgement is given to Dr. Melvin B. Kline and Dr. Melvin W. Lifson for granting permission to freely use ideas from their Systems Engineering Lecture Notes (Ref. 14). These notes are the latest updated version of material contained in Refs 15 and 16. Portions of this section are quoted verbatim from the lecture notes.

the system. The user provides the requirement inputs to which the producer designs the system. The producer's functions entail transforming the needs provided by the user into the design, production and installation of the system. All systems have both users and producers.

In the Department of Defense there are both internal and external user-producer relationships. As an example of these relationships in a Navy context, the users of the system are the operating forces represented by the Office of the Chief of Naval Operations (OPNAV) and the producer is the Naval Material Command (NAVMAT). OPNAV states the operational needs and NAVMAT translates these needs into requirements and basic design. Once NAVMAT has developed system requirements and basic design, it assumes the user role in the Navy's relationships with industry, the ultimate producers of the system.

This user-producer relationship exists throughout the life cycle of a system. There must be extensive interaction between the two, particularly in the formative stages of an acquisition, in order to ensure that the system developed and produced actually meets the need for which it was intended in a cost-effective manner.

When progressing from the beginning to the end of the life cycle, there are a number of phases through which the system must pass. In the most general sense, there are three distinct periods - the Planning Period, the Acquisition Period, and the Use Period (Figure 1). Planning is

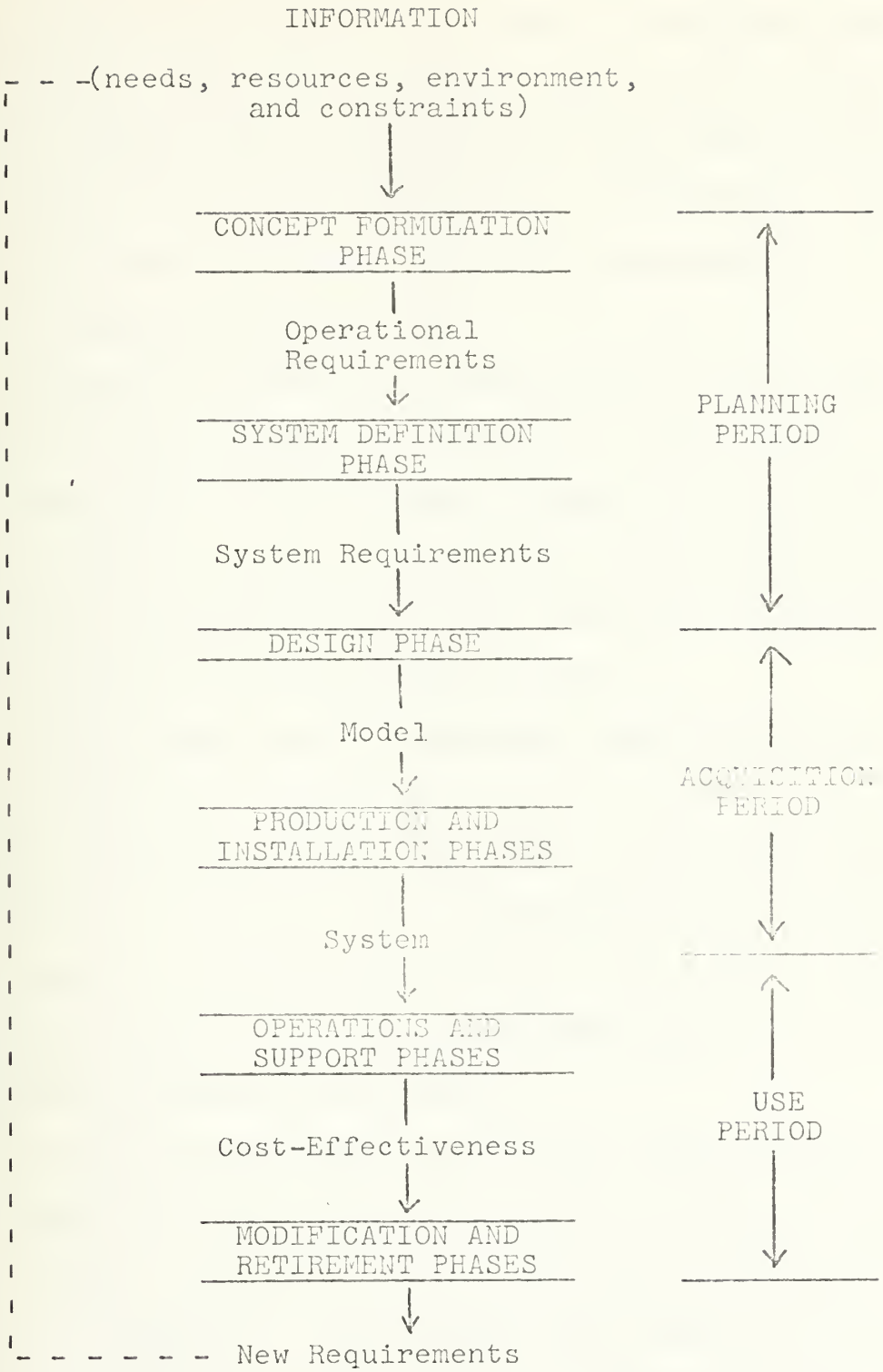

Figure 1: System Life Cycle

the initial period in the life cycle. During this period, the need for the system is established, operational and systems concepts are formulated, and the feasibility and worthwhileness of these concepts are established. The output of the Planning Period is system identification and a set of system requirements.

Planning is primarily a responsibility of the user because of his initimate involvement in the ultimate operation and support of the system, because he is directly concerned with the resources available and the needs to be satisfied, and because he is best qualified to specify the requirements of the operational system.

Although the user is responsible for planning in the system life cycle, seldom is he able to perform the planning period activities without help from the producer, either internal or external. Thus, during this period, the external producers (contractors) may be called upon to help the internal producer (NAVMAT) who in turn assists the users in defining system requirements.

The Acquisition Period encompasses those activities necessary to design, test and evaluate, produce and install the system. This period is the prime responsibility of the external producer. The producers must transform the system requirements established during the Planning Period into a model of the system, represented by a tested and evaluated prototype and the engineering drawings, specifications, and

data which are used to produce and install the system, ready for the system user.

The Use Period consists of those activities required to operate, support, and maintain the system, and finally, to dispose of the system. This period is again the responsibility of the user and thus the cycle is completed where it began, with the user. Eventually this then leads to the generation of new requirements and the cycle starts again.

Each of these periods in the system life cycle may be divided into a number of phases and stages. The Planning Period may be separated into two phases, Concept Formulation and System Definition. The Acquisition Period consists of Design, Production, and Installation Phases. The Use Period is partitioned into four phases called Operation, Support, Modification, and Retirement phases.

While there is interaction between the Services and OSD throughout the system life cycle, the primary concern of this thesis has to do with the Planning Period and the Design Phase of the Acquisition Period.

A. THE PLANNING PERIOD

The Planning Period begins with information - information about the needs for which the system is to be designed, resources available, the environment in which the system will operate, and constraints, if there are any. This input information is critical because it establishes the boundaries of the planning problem.

The output of this period consists of a specified set of system requirements for designing the system. These output requirements are derived from the input information through the activities which comprise the Concept Formulation and System Definition Phases.

Concept Formulation is the initial phase of the system life cycle in which efforts are directed toward identifying and evaluating the system operational requirements in sufficient detail to form a basis for the follow-on phase. The requirements at this point are general in nature and develop in the military from a threat and mission analysis. Important factors such as systems effectiveness, technical, financial, and economic feasibility are identified on a system basis.

Three major decision points may be identified within Concept Formulation:

a. Is the mission which is required to fulfill the recognized needs feasible - technologically, economically, financially, legally, politically, environmentally, socially?

b. What is (are) the best approach (es) (i.e., the best system concept) for performing the specified mission?

c. Is further development of the best approach justified?

In the context of Navy Research, Development, Test and Evaluation (RDT&E) Program, the inputs to this phase are

often in the form of Tentative Specific Operating Requirements (TSORs). TSORs are formal "tentative" requests from OPNAV (user) to NAVMAT (producer) outlining the general characteristics of a system to meet a defense need. They are tentative in that possible systems have not been sufficiently defined to make a decision whether to develop the system. TSORs do not establish firm requirements and they do not authorize commencement of a new development program but they do establish a need for new or improved capabilities.

The producer's response to a TSOR in Navy development is called the Proposed Technical Approach (PTA). The PTA is prepared by NAVMAT and outlines technical approaches by which a particular capability may be achieved. The PTA serves several purposes:

1. It formally introduces technology into the proposed system.
2. It states alternatives and outlines the various risks involved.
3. It provides OPNAV with supporting technical and financial information upon which to base a decision to commence a development program.
4. It provides the technical and financial information necessary for the preparation of a Specific Operating Requirement (SOR).

Equipped with the PTA, OPNAV is in a position to establish a firm requirement for new or improved capabilities. The

SOR defines the performance throughout the system's operating environment and establishes the goals for reliability, maintainability, and personnel requirements.

In response to the OPNAV SOR, NAVMAT generates a Technical Development Plan (TDP). The TDP comprises a plan for the fulfillment of the requirements in the SOR. It is a complete and detailed description of the effort necessary to accomplish the development together with time and funding schedules. Generation of a TDP marks the end of Concept Formulation.

B. ACQUISITION PERIOD

Upon completion of the Planning Period, the user is equipped with the necessary information to enter the Acquisition Period. As discussed earlier, this period is concerned with the design, test, evaluation, production, and installation of the system. It includes three phases - the Design Phase, Production Phase, and the Installation Phase (Figure 1). Discussion in this thesis is limited to the Design Phase.

The Design Phase encompasses the portion of the Acquisition Period of the life cycle during which the major system design cost and time occurs. The activities of the Design Phase and its stages are intended to reduce uncertainty as the design proceeds. The requirements specifications identified in the Planning Period are the inputs to this phase. The output is a model of a system configuration,

demonstrated and evaluated to meet requirements based on the specifications generated in the System Definition Phase.

Design may be divided into five stages:

1. The Preliminary Design Stage commences with the selection of one of the feasible design concepts for implementation. As the name implies, should the pursuit of the chosen design concept prove to be undesirable or to have shortcomings as it is refined during this stage, then an alternative design may have to be explored or the undesirable portion of the design modified. Preliminary Design is a finer development of the system definition process than the Planning Period phases and considerably more information will now become available for design review.

2. The Engineering Development Stage continues the intensive development and design of the system and all its subsystems. The purpose of this stage is to indicate that specified system performance in areas of low confidence can indeed be achieved. Major emphasis is placed on demonstrating the technical soundness of the selected preliminary design. In large complex systems, it is often not feasible to build an experimental model of the complete system. Rather, such models will often exist at equipment or lower levels as breadboards, brassboards, wind-tunnel or hydrodynamic models, etc. Confidence in systems and subsystems effectiveness and cost is increased through analysis and test of such experimental or developmental models.

3. With the performance requirements demonstrated to be feasible or midified as a result of the Engineering Development Stage, the Detail Design Stage now becomes of paramount importance. There is considerable overlap between these two stages with a significant detail design effort being performed during the Development Stage. The distinction is rather one of degree and indicates primarily a shift in emphasis.

Close attention must be paid during this stage to all design requirements. Specific details are worked out down to the smallest part. Analyses and tests are made to assure that the design is producible. In addition to performance, other system engineering considerations such as maintainability, reliability, human factors, safety and training must be included to assure that the design is operable and maintainable by personnel and not hazardous. Logistics design considerations must also be incorporated so that the design will be supportable.

4. In the Test and Evaluation Stage, a test model or prototype is subjected to full performance and environmental tests under service conditions. These should also include operational suitability, reliability, maintainability, and such other tests as necessary to demonstrate that the system can be expected to meet its effectiveness requirements under service conditions. Test and evaluation should include confirmation of design predictions and analyses and an

assurance that tolerances and other problems of variation will be minimized during production of the system.

5. The Production Design Stage follows the evaluation of the test model or prototype and includes any redesign necessary as well as the establishment of production processes, production tooling, production and quality test procedures and equipment.

C. DEFENSE SYSTEMS ACQUISITION PROCESS

Although the system acquisition process terminology has undergone numerous changes, the basic life cycle evolutionary process, as discussed in the previous sections, by which a need is transformed into an operational system remains essentially unchanged.

For management purposes, the life cycle of a system has been divided into five phases (Conceptual Phase, Validation Phase, Full-Scale Development Phase, Production Phase, and Deployment Phase), with a DCP/DSARC decision between adjacent stages, except for the last two phases. For consistency, this breakdown and terminology will be used when discussing the DCP/DSARC Process throughout this thesis. These phases are defined as follows:

1. Conceptual Phase - This phase is conducted at the discretion of the Service Components without specific approval by OSD. During this phase, the technical, military and economic bases for an acquisition program are established through comprehensive systems studies and

experimental hardware development and evaluation. It includes the early conception of new systems and the program execution required to provide the technology necessary to make the concept technically feasible.

2. Validation Phase - This is the phase in which the major program characteristics, through extensive analysis and hardware development, are validated and is often identified with Advanced Development. It is preferred that reliance be placed on hardware development and evaluation rather than paper studies, since this provides a better definition of program characteristics, higher confidence that risks have been resolved or minimized and greater confidence in the ultimate outcome.

3. Full-Scale Development Phase - During this phase, the defense system including all of the items necessary for its support is designed, fabricated and tested. An essential activity of the development phase is test and evaluation, both that conducted by the contractor and that conducted by the Service Components.

4. Production Phase - During this phase the defense system is produced for operational use.

5. Deployment Phase - During this phase, the defense system is provided to and used by operational units.

The Research, Development, Test and Evaluation (RDT&E) program structure used in the Department of Defense is predicated upon the methods of budgeting used to fund certain phases of the acquisition. The funding categories are

called Research, Exploratory Development, Advanced Development, Engineering Development, and Operational Systems Development. These five categories, which were discussed in greater detail in Section II, are defined as follows (Ref. 17, p.0237):

1. Research - Research includes all effort directed toward increased knowledge of natural phenomenon and environment. This is the research-in-science phase.

2. Exploratory Development - This category includes all effort directed toward solution of specific military problems. This is the research-in-technology phase.

3. Advanced Development - Includes all projects which have moved into the development of hardware for experimental or operational test. This is the initial-application-of-new-technology phase.

4. Engineering Development - This category includes those development programs being engineered for service use, but which have not yet been approved for procurement or operation.

5. Operational Systems Development - This is identical with Engineering Development except that developments in this category have been approved for production and deployment. Engineering Development and Operational Systems Development together constitute the transfer-of-new-technology-to-production phase.

The RDT&E categories and the life cycle DCP/DSARC process phases can be roughly related as shown in Figure 2.

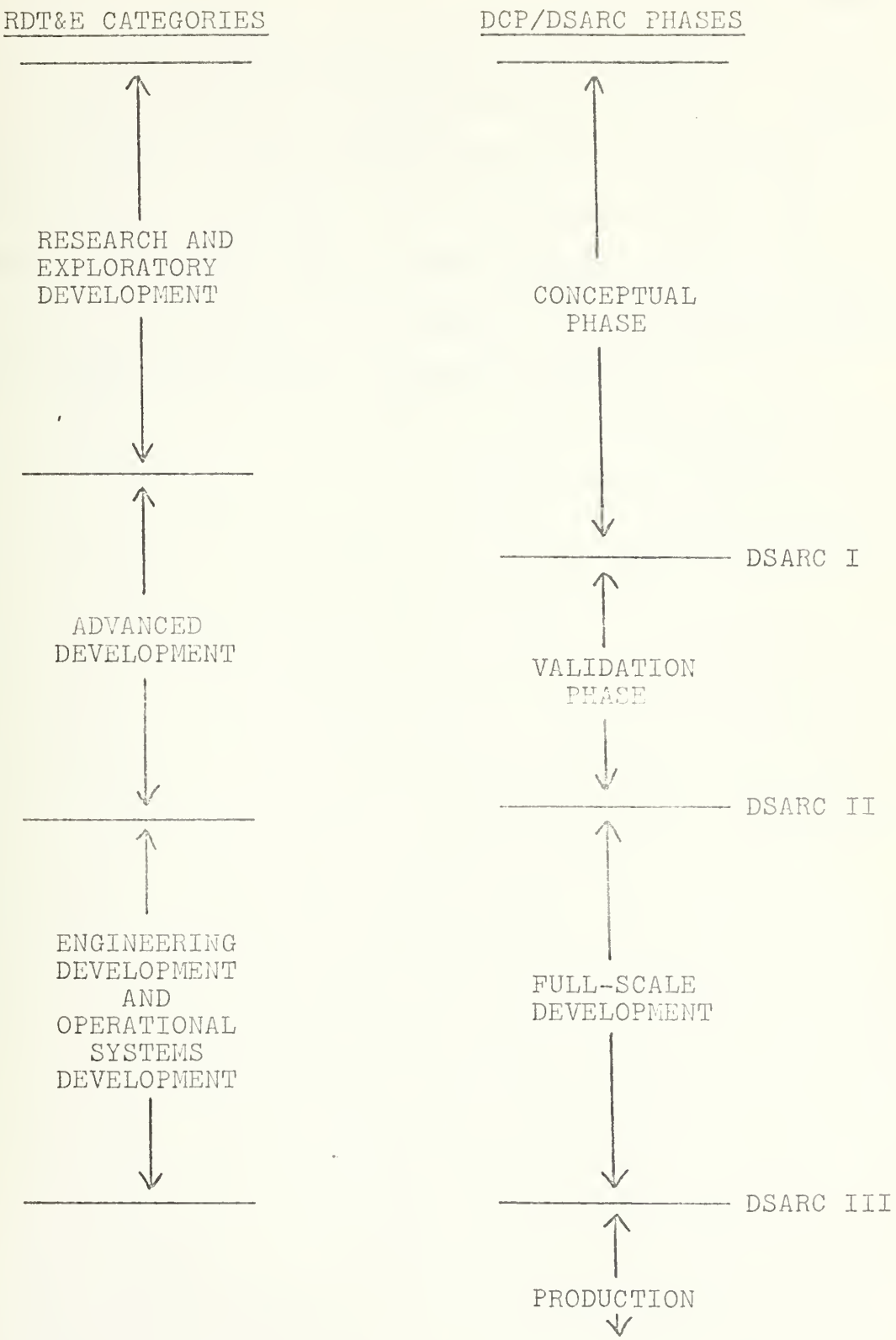

Figure 2: RTD&E Categories and DCP/DSARC Phases

The difficulty in equating these two stems from the meanings attached to each term. With only a few exceptions, there are no clear lines of division between each phase. Consequently, Figure 2 is presented primarily to facilitate an understanding of the general relationships between the RDT&E categories and the DCP/DSARC phases. In the ensuing sections of this thesis, the phases of the DCP/DSARC process will be used in an effort to avoid confusion.

IV. THE DEVELOPMENT CONCEPT PAPER

Secretary of Defense Robert McNamara established the Development Concept Paper (DCP) late in 1967. The DCP resulted from his dissatisfaction with the fact that certain previous defense systems had been carried into development without adequate consideration being shown as to how the system would be used, its cost, and its military effectiveness balanced against its cost. He felt that many existing weapon systems used in a different manner or modified slightly could provide the same capability which new proposed systems would supposedly provide.

For this reason, he stated "...in planning the R&D program, we must consistently focus our attention on the new or improved capabilities that are required, and not just on the vehicles. ...

"Before a system is moved into Engineering Development, or into any costly phase, we need to determine as precisely as possible the threat it will face, the operating capabilities we will need, alternative ways of meeting the threat, the size of the force proposed, the time schedule to be followed, and the probable cost of each alternative. ...

"What we needed was an overall plan which would tie all of these elements together into a comprehensive balanced analysis. Accordingly we inaugurated last fall a new device which we call the Development Concept Paper."(Ref. 8, p.155)

Discussing the DCP, the Assistant Secretary of Defense (Installation of Logistics), Barry Shillito, said "...This management tool was instituted primarily to insure that a comprehensive look would be taken by the Secretary of Defense and his appropriate principal advisors at a major decision point on an important program, e.g., before heavy financial resources were committed to the development of a major program. ... Important systems are those which are anticipated to require at least $25 million of RDT&E or $100 million of production funds or both, are high priority, or are otherwise important, e.g., because of unusual organizational complexity or technological advancement." (Ref. 18, p. 6)

The DCP was initiated by Mr. McNamara in an attempt to improve decision making and implementation on important development programs. The document was intended to increase assurance that:

1. The full military and economic consequences and risks of programs were explored before they were initiated or continued.
2. Information and recommendations on the programs were prepared collaboratively or coordinated with all interested parties prior to review by the Secretary of Defense.
3. The premise and essential details of the Secretary's decision on programs was recorded and made known to those principally responsible for their implementation.

4. An opportunity for review would be provided the Secretary of Defense if any of the information or premises on which his decision was based changed substantially. (Ref. 19, p. 35)

B. INITIAL CONCEPTS

The DCP was intended to ensure that all pertinent major management issues were raised so that the Secretary of Defense would be apprised of each issue. Dr. John Foster (Director, Defense Research and Engineering) stated in 1968 "What the decision-maker would really like is to have just one paper; short enough so that he can study it carefully; comprehensive enough to represent the issues, facts, and analysis which are truly relevant and material to his decision; comprehensible so he can understand it; and impartial - in that it includes the best case which can be made for the system, and the best case which can be made against it - all on the same base." (Ref. 20, p. 49)

The Director of Defense Research and Engineering (DDR&E) was to be responsible for the preparation and coordination of DCPs. This assignment was made to mesh with DDR&E's primary responsibility for determining feasibility, cost, and effectiveness of proposed developments. An individual in DDR&E was assigned as action officer and made responsible for circulating the draft DCP among appropriate OSD and Service offices to hammer out exactly what pertinent issues should be included in the DCP. He obtained signatures

from the OSD Assistant Secretaries and the appropriate Service Secretary with their recommended alternatives and justifications therefore. These signatures indicated that the signers were satisfied that the issues presented were substantive and relevant, and that from the point of view of each of their offices, the DCP contained the best justifications in support of their positions. In its final form the DCP was presented to the Secretary of Defense for his decision.

No formal directives were promulgated to specify the contents of format of a DCP as it was believed that the DCP should be a flexible document which could be changed to meet the situation. What guidance was provided initially was the limitation of the document to 20 pages or less. However, by the end of 1968 the following general format had unofficially evolved (Ref. 20, p. 52).

I. THE MANAGEMENT ISSUE

A. Describe in a couple of sentences what the program is and what it's intended to do.

B. State in a sentence or two whether there is a development issue requiring SecDef decision in the near future and if so when, what the issue is, and how much money is involved.

C. If there are other, broader issues which would help the reader put the DCP in context and, hence, which the reader ought to know at the outset, state them briefly.

D. Summarize (without rationale) the recommendation or, if you believe there are major differences among the interested parties, state each briefly as you understand it.

II. THE PROBLEM AND OUR OBJECTIVES

A. Provide a brief summary paragraph (75 words or less if possible) of why this program was started; don't discuss the program itself.

B. If program is response to a specific threat, describe the threat (now and in future) in as specific terms as possible, including numerical data and, where relevant, uncertainties. Explain in very specific terms why present systems do not (or will not) adequately meet the threat.

If, alternatively, the program is a desirable improvement not tied to a specific threat (e.g., better truck engines, or better air-to-ground munitions), describe as specifically as possible how the new system will do the job better.

The aim here is to make a clear, concise statement of what's wrong (or will later be wrong) with present system(s). If the difficulty is that with present systems we can't meet our military objectives, state this explicitly. Hold to 200 words except in unusual circumstances.

III. POSSIBLE SOLUTIONS

A. State options (if any) for dealing with problem.

B. Summarize - in tabular form if feasible and appropriate - the key elements and features of each possible solution, including present system(s). This section should contain key performance characteristics, and relative aggregated system cost data including procurement costs. There should be a cost annex showing, for each option, R&D, Procurement, and Operating Costs (by main system component where appropriate), for the next five to ten fiscal years, and the source of the cost data.

C. Describe, for each system being considered, the extent to which it is expected to solve the problem (Part II). Use numerical data wherever possible, presented in tables where appropriate.

D. Unless self-evident, explain for each effectiveness measure chosen, relevance to objectives.

E. Provide a summary assessment of the effectiveness of each system being considered, both

relative to the other systems and, if pertinent, in absolute terms as well.

IV. RISKS

A. What major parts of each system under consideration remain to be developed. Briefly describe where each stands. State the technological risks involved in completing each development or, if there are none, explain why (e.g., while no engine has yet been selected for this aircraft, the necessary performance can be obtained from any of several engines now in wide use).

B. For each risk component, identify the impact on overall system performance if the performance of the component falls short of expectations. Where relevant, explain the dependence of total system performance on a single technological risk (e.g., without development of a satisfactory look-down radar, defense of the U.S. against a sophisticated bomber threat is not feasible).

C. Unless done in A or B above, characterize the degree of each risk (e.g., chances are good, about even, or poor that the system will have expected performance).

D. If a system has been under development for some time, state specifically, with numerical data if possible, how performance achieved to date compares with earlier expectations/targets. If shortfalls have occurred, explain expected impacts of each on final performance of system.

E. State briefly our confidence, or lack thereof, in the latest cost estimates for R&D completions, procurement and operating expenses. (If history of earlier cost estimates and performance is relevant, please discuss.) If confidence is less than high, explain specific factors responsible.

F. Summarize in a few sentences the overall technological/economic risks of possible solution.

V. OTHER FACTORS

A. If, beyond the foregoing, other factors should be considered in making a decision, briefly state each and explain its relevance.

VI. THE DEVELOPMENT PLAN(S), MILESTONES, AND THRESHOLDS

A. Provide a chart showing the development of each program over time, including milestones and decision points. Include past and expected future development expenditures for each year, and system performance targets.

B. In addition, if useful, briefly describe the most critical points in each program and, unless self-evident, explain their criticality.

C. If an important consideration, describe operational tests (and schedule) envisioned to verify that expected performance will be achieved.

D. State cost, development schedule, and system performance thresholds which, if crossed, should automatically call for SecDef review of the program.

VII. OVERALL EVALUATION

A. Briefly assess the costs and benefits of each system under consideration, preferably displaying the information in tabular form.

B. Security Guidance.

VIII. RECOMMENDATIONS

A. If SecDef action is, or may be, warranted in the next month or two, state exactly what he should decide, and why.

B. State when the next SecDef decision point (after A above) is expected and what the issue will be.

C. Identify what information not now available will be needed for this decision, and what is being (or should be) done to obtain it. Also assess likelihood that necessary information will in fact be available when needed.

IX. NEXT DCP

A. State when and why DCP should next be revised.

X. DECISION PAGE.

The DCP was a serious attempt to bring impartiality into decision making at all levels. Through careful estimation and evaluation of threat, operational capability, cost, schedule, technical risk, time factors, forces, and alternatives, Mr. McNamara hoped to quell the enthusiastic promises of high performance and low cost which so seldom proved to be valid in the acquisition process. The DCP was to establish thresholds of cost, schedule, and performance which, when breached, would provide a basis for future program decisions.

> "...the threshold sheet would contain figures on technical and operational performance, such as the maximum weight growth which would be allowed before the entire development program is reopened for review by the Office of the Secretary of Defense. Similarly, other thresholds having to do with cost and with schedule are established in ... the DCP. ... Within these bounds, the sponsoring Military Service is fully responsible for the entire management of the program." (Ref. 18, p. 8)

In essence the DCP became a contract between the Service Secretary and the Secretary of Defense.

C. THE PACKARD DCP

Subsequent to his assignment as Deputy Secretary of Defense, Mr. David Packard continued the DCP in use as a decision document. He made several changes in the content and preparation procedures, some of which were quite significant.

One of the first actions he took was to provide the services a narrative description of the responsibilities of OSD and the services in acquiring major defense systems

(Ref. 21). This was an effort to clarify the actual responsibility of these offices with respect to the DCP process.

Preparation of the DCP was made a responsibility of the service components with the stipulation that there first had to be agreement between OSD and the component on a DCP outline. DDR&E continued to be responsible for coordination of inputs.

Mr. Packard established the Defense System Acquisition Review Council (DSARC), which was to meet for review and discussion of program issues prior to forwarding the DCP to the Deputy Secretary of Defense for a decision.

He established different criteria for designating major programs when he promulgated DOD Directive 5000.1. The designation of a major defense system could be due to any of the following:

1. Dollar Value (programs with estimated RDT&E cost greater than $$0 million, or estimated production costs greater than $200 million;
2. National urgency; or
3. Recommendation by DOD component heads or OSD officials. (Appendix B)

V. THE DEFENSE SYSTEM ACQUISITION REVIEW COUNCIL

A. RATIONALE FOR ESTABLISHMENT OF DSARC

The Defense System Acquisition Review Council (DSARC) was established by Mr. Packard (Appendix C) after he had served as Deputy Secretary of Defense for about six months because he recognized the need for improved high-level decision-making. He hoped, by assembling around a table the appropriate principals, to achieve a semblance of impartiality in the decision-making process and to avoid blatant parochialism. There existed other equally strong motivating factors for forming the DSARC. The tremendous cost growth being experienced in numerous programs was becoming public knowledge and generating very bad press for the Department of Defense as well as greater in-depth review by the Congress. Resources were becoming more limited as the share of the defense budget allocated to procurement shrank in terms of its buying power. All of these factors indicated to Mr. Packard the need for a more thorough and detailed analysis of the effects of risk, uncertainty, and costs to the national economy. This was instrumental in his decision to form the Defense System Acquisition Review Council.

B. INTENDED PURPOSE OF THE DSARC

The DSARC was intended to complement the DCP process. Final revisions of DCPs were not to be prepared until after

holding a DSARC review, which would permit coordinated evaluation and deliberation among senior managers to assure that the advice given to the Secretary of Defense would be as complete and objective as possible prior to a decision to proceed to the next step in a system's acquisition cycle. Hopefully, by assembling these principals, certain issues would be resolved prior to passing the DCP to the Deputy SECDEF for decision rather than forcing him to take a stand when all of his senior advisors were taking different positions from one another on issues other than the major ones.

While Mr. Packard was a firm advocate of participatory management, he reserved for OSD the decision-making responsibility as to whether a particular program should be implemented at various decision points in the life cycle since this related to DOD's long term objectives and budget problems. The DSARC meetings were to be used to evaluate the managerial performance of the Services in implementing approved policies and to make decisions on proceeding into the next phase in each major acquisition program. The three points in a system's acquisition cycle at which Mr. Packard felt that a DSARC should be convened are:

1. When initiation of a program is proposed.
2. When transition from the validation phase to full scale development is proposed.
3. When transition from development into production for service deployment is proposed.

If all the DSARC principals were in agreement on the preferred alternative in a DCP, the requirement for a DSARC review could be waived, since there would be no issues to discuss. The reviews which were held covered all issues, program thresholds, and other matters discussed in the DCP. Should the need dictate (e.g., breach of a threshold) or should the Service component request, a special DSARC meeting could be convened.

A significant change introduced by the Packard DCP/DSARC process was the increased emphasis placed on achieving technical performance as well as cost and schedule goals in one phase of the acquisition cycle before entering the next phase. This emphasis on performance was significantly different from the prior major emphasis on cost and schedule milestones.

C. DSARC ATTENDEES AND FUNCTIONS

The DSARC is composed of the Director, Defense Research and Engineering (DDR&E), Assistant Secretary of Defense (Installation and Logistics)(ASD(I&L)), Assistant Secretary of Defense (Systems Analysis)(ASD(SA)), the Chairman of the Joint Chiefs of Staff (JCS) or his representative, and the Secretary of the Service Component. The Program Manager (if assigned) attends as part of the Service Secretary's contingent.

In a December 1969 memorandum (Ref. 21) to the Service Secretaries, Mr. Packard described the responsibilities of

the Secretary of Defense and the Services in acquiring major defense system. (Figure 3) He delineated four degrees of responsibility, as follow:

1. Primary responsibility - This responsibility is held by either the Secretary of Defense or the Service Component, depending on where the program is in the acquisition cycle. (e.g., the Service component has primary responsibility for a program during the conceptual phase, and SECDEF has primary responsibility for the program decision.)

2. Principal Responsibility on OSD - Held by DDR&E from conceptual phase through full-scale development, then passed to ASD(I&L) for production and deployment.

3. Secondary Responsibility in OSD - Held by all four OSD offices for contributing to decision-making process at major program decision points.

4. Monitoring Responsibility - Held by SECDEF at all times when he does not hold primary decision-making responsibility. For financial purposes, monitoring responsibility is held at the same time by ASD(C). ASD(SA) has monitoring responsibility during the conceptual phase only.

SECDEF holds primary responsibility for the key decisions at the transition between phases of the acquisition cycle and monitors the program between decision points. From program inception to phaseout, the Service Component has primary responsibility for program execution in accordance with SECDEF decisions.

RESPONSIBILITIES WITHIN OSD IN ACQUIRING DEFENSE SYSTEMS

	CONCEPTUAL EFFORT	PROGRAM INITIATION DECISION	VALIDATION EFFORT	FULL-SCALE DEVELOPMENT DECISION	FULL-SCALE DEVELOPMENT EFFORT	PRODUCTION DECISION	PRODUCTION	DEPLOYMENT
SEC DEF		●		●		●		
DDR&E	◑	◑	◑	◑	◑	○	◑ → ◑	
ASD (I&L)		○		○		◑		◑
ASD (C)	X	○	X	○	X	○	X	X
ASD (SA)	X	○		○		○		

● PRIMARY RESPONSIBILITY

◑ PRINCIPAL RESPONSIBILITY IN OSD

○ SECONDARY RESPONSIBILITY IN OSD

X MONITORING RESPONSIBILITY

This chart presents the various functional responsibilities within the OSD during weapon systems acquisition. It is significant that the principal responsibility resides in the DDR&E until a time established by the Defense Systems Acquisition Review Council when it meets for the production decision.

Figure 3.

During the Conceptual Phase, the Service Component holds primary responsibility for identifying operational needs and new systems to meet those needs, starting a dialogue with OSD on the new systems and the critical points for decisions on those systems; identifying competing systems; conducting required analyses; conducting technology and component development and critical experiments; preparing cost and schedule estimates; and optimizing conceptual systems in order to arrive at a proposed system and program.

DDR&E has principal responsibility in OSD for monitoring the conceptual program as it evolves, and serves as the OSD leader for the dialogue with the services on service estimates of threat, costs, risks, trade-offs and the pros and cons of alternative systems. DDR&E takes the initiative within OSD to identify major issues, the analysis of experimentation required to resolve technological issues, and initiates DCPs that are required.

ASD(C) is responsible for monitoring the program to assure that it stays in balance with the DOD budget and that the proposed program budget and funding profile are reasonable.

ASD(SA) has monitoring responsibility for evaluating the force structure implications and for evaluating the realism of cost estimates for the program.

SECDEF monitors the Conceptual Phase through DDR&E and the Assistant Secretaries.

The Program Initiation Decision is made by SECDEF by means of a DCP supported by a DSARC. At this point in time, SECDEF has the primary responsibility for making the decision whether to initiate a development program or to make some alternative decision.

DDR&E has principal responsibility in OSD for preparation and coordination of the DCP to be used for obtaining a SECDEF decision. DDR&E chairs the DSARC that meets to discuss issues in the DCP and forwards the DCP to the Service Component for implementation after SECDEF's decision.

ASD(I&L) has secondary responsibility in OSD for evaluating the proposed program and decision alternatives, particularly from a standpoint of procurement, production, facilities, and logistics, and provides his recommendation through the DCP and DSARC.

ASD(C) has secondary responsibility in OSD for evaluating the proposed program and decision alternatives, particularly from the standpoint of balance of the overall budget and funding profile and fair and accurate representation of the cost and funding. He provides his recommendation in the same way as ASD(I&L).

ASD(SA) has secondary responsibility in OSD for evaluating the proposed program decision alternatives, particularly from the standpoint of force structure implication - numbers of weapons systems needed and timing of the IOC - and the realism of cost estimates. He makes recommendations in the same manner as ASD(I&L).

Additional responsibilities discussed in the memorandum are concerned with later phases of the acquisition cycle and are not germane to the subject of this thesis.

D. THE INITIAL DSARC

Mr. Packard provided considerable leeway in timing for the initial DSARC, unlike the fairly narrow time span for the DSARCs held prior to entering Full-Scale Development and Production. In fact, where it appeared, from informal discussion or comments on the draft DCP, that there was agreement among the DSARC principals and the Service Secretary on the same program alternative, a DSARC meeting was not even required for the first milestone. Flexibility in timing was in keeping with Mr. Packard's desire to keep programs in the Conceptual Phase longer, until more reliance could be placed on hardware and less on paper studies. This approach of experimental prototyping was intended to help in the decision of what was really wanted prior to commitment of large sums to Full-Scale Development and Production. Thus the Service Components could conduct, at their own discretion, a considerable amount of Advanced Development prior to requesting a DSARC. This enabled them to obtain a firmer knowledge of areas of risk and to develop more accurate estimates of costs involved.

The purpose of the Milestone I DSARC meeting is to determine whether or not the Conceptual Phase has been completed and whether the program is ready to transition to

the next phase. The review is held at such time that the developing Service has determined that:

1. The system satisfies a real military need, is worth its cost and is of sufficient priority to be funded within overall fiscal constraints.
2. Mission and performance requirements have been adequately defined.
3. Major uncertainties have been identified and a suitable method of resolution is planned for the Validation Phase.
4. Preliminary cost and schedule estimates are realistic and acceptable.
5. The management approach and program planning are sound.
6. The DCP thresholds are well defined and provide the flexibility for accomplishing the appropriate trade-offs in the Validation Phase while insuring the surfacing of significant problems.

The DSARC presentation relates to the DCP, specifically addressing the issues in the DCP and the viability of thresholds. It addresses the program's readiness to transition to the next phase (i.e., prerequisites). The presentation assures that the proposed program is consistent with the DCP. Because this first review is usually conducted early in the Advanced Development phase, less specific and accurate information is available than would be on hand for a later

review. Consequently, this review looks at the issues from a broader point of view. This does not mean that this decision-point is any less important; the opposite is actually the case. Both Secretaries of Defense McNamara and Laird recognized that inadequate planning and review at the conceptual stage of development had led to many of the overruns and poor performance of systems encountered in recent years. The initial DSARC is of vital importance to the entire program. What is decided at this decision point will be reflected in and used as the basis for future decisions concerning the procurement of the system.

VI. DSARC DECISION-MAKING REQUIREMENTS

A basic assumption of the authors is that there is a fundamental decision-making and management method by which major defense systems acquisition should be managed. In its basic form, this method must contain elements and processes by which the following objectives can be achieved:

1. Key decision-making at SECDEF level. Exactly what constitutes a key decision has been argued at length at all levels of the Defense Department. Key decisions are few in number and must be of sufficient importance as to warrant the consideration and judgment of the Secretary. However, the Secretary must be involved in the decision-making process frequently enough to ensure that he has some measure of control over the progress of a program. Care must be taken to prevent the escalation of decisions "to the top" on issues which can and rightly should be made at a lower level within the Department of Defense. Escalation of decisions normally comes about either because individuals at a subordinate level are not willing to accept the responsibility for their decisions or because the top level manager (or his staff) is in doubt as to the decision-making ability of subordinate managers. In either case, the number of decisions placed before the top level manager become greater and control becomes more centralized. Past experiences in DOD with centralized control have proven that this approach

to management is essentially unworkable.

> "Indeed, attempts to over centralize decision-making at the top seriously impair the Secretary's (SECDEF) capability to exercise effective control. Under such circumstances far too many decisions go unmade, critical issues are not addressed, problems are deferred and the principal of personal accountability is lost in the confused maze of 'staff coordination'" (Ref. 2, p. 21).

2. Specific assignment of responsibility. In any major defense system acquisition there are almost countless tasks and functions that must be performed properly and in a timely manner in order for the acquisition to proceed. These tasks and functions must be identified and responsibility for their accomplishment must be established. When responsibility is initially assigned to an office or organization, it falls upon that office or organization to specifically designate the individual(s) who will be held accountable for the accomplishment of each task. By simply holding "the Service Component" or "OSD" responsible, the accountability is again lost in the "confused maze of staff coordination" as quoted earlier.

3. Proper timing of decisions. In order for the decisions made by the Secretary of Defense to be effective and to provide him with the necessary control over the acquisition of a new defense system, the timing of his decisions is critical. If a decision is made too early it would be based upon incomplete and possibly incorrect information which could result in erroneous conclusions. Conversely, if a decision is made too late, there is essentially no

decision to be made. The alternatives are limited to the extent that the decision becomes essentially an approval of what is already being done. Therefore, the point in time when the Secretary interacts in the acquisition process is of vital importance. The variety of situations encountered in individual acquisition programs precludes basing these decision points on a fixed time basis. As key decisions requiring Secretary of Defense action are defined, the timing is predicated upon the reasons for the decisions and what information must be available in order for the Secretary to be able to make a sound decision.

Decision-making at levels below the Secretary of Defense are equally important and must be approached in a similar fashion. Identification of decision points, the reasons for the decisions and the information necessary to support the decision and who is responsible for the decision must all be addressed so that decisions are made at the proper time, not too early nor too late.

4. Adequate monitoring and validation. The necessity of having certain key decisions made at the Secretary of Defense level goes without question. Although the Secretary may delegate responsibility for the development and production of a new defense system to a Service Component, he retains full responsibility for providing adequate national defense. This responsibility manifests itself in the decisions he must personally make. Also the Secretary's responsibility requires that he have a means of monitoring

program progress and for validation of Service Component recommendations. Here too, care must be taken to prevent the functions of monitoring and validation from becoming control and direction. In a bureaucracy the size of the Defense Department, there is a tendency for those charged with the task of monitoring or validating to become sufficiently powerful that they begin to control. This monitoring and validation requirement is also applicable at levels below the Secretary.

The above method for management and decision-making is essentially what Secretary Packard used when he issued Department of Defense Directive (DODD) 5000.1, "Acquisition of Major Defense Systems" in July 1971. The process as espoused by Mr. Packard is simple in concept and sound as a management philosophy. It provides for key decisions to be made by the Secretary of Defense, continues the use of the Development Concept Paper (DCP) as the means by which issues and considerations which should go before the Secretary for decision are pulled together and agreement established between participants in a particular program, and uses the Defense System Acquisition Review Council (DSARC) as the body for reviewing all significant issues and considerations and for making recommendations to the SECDEF. Both the DCP and DSARC when employed in this context support the Secretary and provide him with a monitoring and validation capability while at the same time retaining the desirable

features of having the Service Components responsible for the development and procurement of defense systems.

A. ACCOUNTABILITY

As discussed in Section II, the radical difference in management styles of Mr. McNamara and Mr. Packard serves to emphasize the strong effect personality factors have had on decision-making in the Department of Defense. Mr. McNamara tended to become involved down to minute detail while Mr. Packard concerned himself with those areas which he considered to be of greatest importance and ones that warranted decision-making at the highest level. Mr. Packard demonstrated a preference for balancing experience and analysis to obtain the best results from both approaches.

In order to achieve a balance between the analytic approach to decision-making and the more pragmatic approach based on the knowledge and practical experience of the men who must employ the systems in the field, Mr. Packard felt that greater reliance must be placed in the recommendations of the military services. While the value of systems analysis and other disciplines in developing a new defense system is recognized, these cannot be the sole basis for making decisions at the Secretary of Defense level. For the most part, the advocates of these disciplines usually lack the practical experience with which to evaluate their analysis. Past experience in weapons acquisition has indicated that neglect of the views of the "men in the field" has been a

major contributing factor in the procurement of weapons which did not adequately meet a defense need.

Conversely, reliance solely on military experience for decision-making is equally invalid. By giving greater responsibility to the Services for the initiation of new programs, OSD must expect the services to employ sound analytical methods, to support and build on their military experience. In brief, for the services to be given the freer rein they desire in defense system acquisition, they must rely equally on an analytic approach and application of military judgment in developing their recommendations.

In the past and, to some extent, even now, the Service Component which originated a proposal for a new defense system program lacked the capability for analytical validation of its proposal before seeking approval from higher authority. This validation should be based upon a thorough analysis of the mission and the present or programmed means for accomplishing the mission in light of the predicted threat and the efforts of the other services to meet the threat. The Services have made significant advances toward improving their analytical capabilities through the implementation of analytic techniques.

Lack of definite responsibility has been cited as a problem both in DCP preparation and in the initial DSARC review functions. When responsibility is not clearly defined, it is not possible to have the degree of accountability necessary for proper management of a program. To be

effective, responsibility and accountability must be placed on an individual rather than in an organization. It is only in this way that authority can be exercised and individuals will know their functions and accept responsibility for their actions and decisions. Today it seems that everyone is extremely anxious to "help," but at the same time is very unwilling to be held responsible for his actions.

Secretary Packard emphasized the need for a few good men in managing programs. He made an attempt to obtain strong Program Managers who would be able to conduct their programs free from interference by others and he attempted to reduce the pressures placed upon these managers from above, both in OSD and in the parent service. Also he directed that the Program Managers be given greater authority and that they should be held accountable for the progress of their programs. Mr. Packard believed that the Services should be held responsible for their actions and that the Services should be required to improve their performance rather than have their responsibility abrogated by establishing additional controls at the OSD level.* His efforts in this area brought about a degree of improvement in the performance of the Services which can be expected to continue if OSD can resist the temptation to over-control the acquisition process and instead hold the Services responsible for their actions. A rather simple analogy would be the

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*Interview with Mr. David Packard, 30 October 1972.

commanding officer of a ship who does not believe the Engineering Officer is performing his duties properly. The C.O. either fires the Engineer or brings pressure to bear to cause the Engineer to fulfill his responsibilities. The C.O. does not assume the dutues of the Engineer.

A frequent problem arising in past DSARC reviews has been OSD's belief that the Services have not adequately analyzed the threat (actual or potential) in justifying the need for a new program. Because of this belief, OSD is currently proposing changes to the DSARC process so that the threat problem can be examined at the OSD level earlier in the life cycle of a program. If, in fact, the Services are to be responsible for the initiation of new programs, then OSD should hold them as accountable for the threat analysis as for any other part of the program. Therefore, if the Secretary of Defense is dissatisfied with the performance of the Services in this area, it behooves him to force the services to improve their threat analysis rather than elevating this function to the OSD level.

VII. CONCLUSION

While assembling material for this thesis, the authors were impressed by the number of panels, commissions, studies, conferences, and symposia which have been convened and commissioned to study the organization of the Department of Defense, the Service Components and the systems acquisition process. Invariably, numerous recommendations were made by each group and occasionally a few were implemented. The reasons that many of the recommendations were not implemented are many and varied, ranging from the need for the Congress to enact legislation to the fact that some of the recommendations were so weak that implementation was not warranted.

The complex problems faced in defense systems acquisition defy total and completely efficient management because of the numerous goals served by the acquisition process. These goals have resulted in the requirement that the systems acquisition process not only meet defense needs, but at the same time fill extensive socio-economic-political needs. While many of these goals are beneficial to the nation as a whole, it must be recognized that serving these goals frequently results in increased costs and inefficiencies. Rather than dealing with a contractor who could actually produce the best system for the least dollars, DOD is frequently required to deal with a firm which has the best

equal opportunity record, is located in a labor surplus area or in the state of the currently "in" congressmen, gives out large shares of its work to small business, etc. Then when a company which is awarded a defense contract based on one or more of these factors is unable to perform the contract, the Services and OSD are charged with mismanagement and ineptitude.

These comments are not made because the authors believe these goals will ever be changed, but because they are fact. The majority of studies and panels have skirted these issues, and take the position that internal DOD reorganization will miraculously improve acquisition procedures. It will not.

Mr. Packard recognized the inability of DOD to control many of these external influences and constraints when he promulgated his policies on acquisition. He made little effort to build new organizations and empires which would ultimately tend to increase the problems already existing in the acquisition process. Rather, he tried to break them down and simplify system acquisition management.

The background portion of this thesis provides ample evidence of a long established and frequently used approach to "improving the present system" through reorganization. The longevity of this concept is shown by a quote from the Blue Ribbon Defense Panel Report of July 1970:

> "...we tend to meet any new situation by reorganizing and a wonderful method it can be for creating the illusion of progress while producing confusion, inefficiency and demoralization."
>
> Petronuis Arbiter, circa A.D. Sixty

It is not the intention of the authors to create a further "illusion of progress," but to tender the following suggestions by which the initiation of a major defense system acquisition may be streamlined.

1. The first DSARC, Program Initiation Decision, is requested by the Service Component when it is determined by the Component that a major defense system program should be pursued. This marks the end of the Conceptual phase. This decision point is the only one during system acquisition in which the Service Components have a degree of latitude in timing the request for the decision, since the other two major decision points are firmly linked to the Full-Scale Development and Production phases. The flexibility allowed in the timing of the Program Initiation Decision is necessary due to the wide diversity in type and complexity of major defense system programs, i.e., some programs might push the "state of the art" and require extensive experimentation in order for the Service Component to be able to assure the Service Secretary and OSD that continued development is justified, others might be composed mainly of off-the-shelf hardware requiring little experimentation. An affirmative Program Initiation Decision is recognition by the Secretary of Defense of a valid operational requirement for a defense system.

The initial Secretary of Defense decision should come during the Advanced Development phase of the RDT&E program structure (see Figure 2) as currently established in

DODD 5000.1. To have this initial decision at the beginning of Advanced Development or earlier would be unwise as it could have the following implications:

a. OSD would become involved in deciding which alternatives are to be pursued by the Service Components during Advanced Development. This might eliminate some options of high potential and could stifle innovation on the part of the Service Components by having formal control too early in the procurement process. By conducting some Advanced Development before the initial DSARC, the Service Components are better able to address cost, schedule, and performance of all the options under consideration.

b. Cancellation of programs which get into trouble would be less likely to happen because of the reluctance on the part of OSD to stop a program which it had earlier approved. The approaches being pursued would be those selected by OSD and not necessarily those selected by the Service Component and for OSD to cancel one of its own programs would be indicative of a poor initial decision. (i.e., it would violate the inevitable success syndrome.)

c. The desirable results which are obtained through competitive approaches among the Service Components would be reduced and the stereotyped service roles would be emphasized.

d. The decentralization (participatory management) philosophies of DODD 5000.1 might be severely restricted because of the earlier OSD involvement. The Service

Components should be allowed to independently pursue in Advanced Development those alternatives which they consider appropriate so that unknowns may be reduced and so that Service recommendations to the DSARC might be based on better information.

e. Congressional concern over cost growth would continue and possibly increase because the Service Components would be required to address technical, financial, and effectiveness questions without having accomplished the development prerequisite for establishment of reliable estimates.

On the other hand, the Service Components must recognize the importance of requesting the initial program decision early enough in development that the Secretary of Defense actually has viable alternatives to consider and is not restricted to approving or disapproving one and only one alternative, as could result from keeping a program in development so long that the service presents a "solution" rather than a range of possible solutions. This delaying tactic has allegedly been employed at times in the past and is a contributing factor in the "credibility gap" that currently exists between OSD and the Service Components. Each group, OSD and the Service Components, must appreciate the role of the other and strive for a supporting relationship vis-a-vis adversary relationship. This can be accomplished only through mutual understanding and confidence

that each will support the needs and responsibilities of the other.*

The authors concur with Mr. Packard's observation that too many defense programs are formalized by the DCP/DSARC process too early. Accordingly, procedures and funding methods should be instituted which would allow the Service Components to continue potential programs in the Conceptual phase longer so that when a program comes before the DSARC for the program initiation decision, the decision will be based on sound technological and cost and schedule information. This would result in a greater expenditure of dollars in the Conceptual phase and more alternatives would be pursued further along before final selection is made but by taking this approach, far better cost data, analysis of risk and uncertainty, and schedule data would be available for each of the alternatives.

2. Although each decision made during the development and production of a defense system is in itself important, perhaps the most crucial single decision is the Program Initiation Decision resulting from the first DSARC review. This decision, of the three key decisions made at the Secretary of Defense level, is based on more subjective

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*The need for a supporting relationship between OSD and the Service Components in Defense Systems Acquisition is discussed more fully in Preparation for the Defense System Acquisition Review Council, a thesis by LCDR W.P..Bancroft, USN and LCDR T.S. Brady, USN, Naval Postgraduate School, Monterey, Calif., March, 1972.

factors because less quantitative information is available and because there is inherently greater risk and uncertainty in the early stages of development of a program. As a result, parochialism and service interests tend to become more prevalent than later in the acquisition process when decisions can be based on proven milestones. To reduce the impact that individual groups or offices could have on the direction that the council's recommendations take, the chairman of the initial DSARC should be the Deputy Secretary of Defense. The other OSD officials who participate should be considered subordinate to the Secretary but equal to each other so that no one of these officials will tend to dominate the discussion. By being the chairman, DEPSECDEF would hear all sides and be able to direct the discussion toward issues which he considers must be resolved in order to support his decision-making responsibility. He would have the advantage of being able to remain more objective than the Assistant Secretaries whose staffs have vested interests in the direction the council takes. Also, as chairman, DEPSECDEF could effectively lessen much intra-OSD and inter-service parochialism.

Recognizing that the Deputy Secretary of Defense has many functions which place demands upon his time, the chairmanship of the initial DSARC should be considered of sufficient importance that this responsibility would not be delegated. If this function is delegated, then the benefits discussed above could be lost.

3. The Service Component should be held totally responsible for the preparation of the initial DCP. Within the Service, one individual who can be held accountable for the quality of the contents of the DCP should be assigned as the "program advocate." This individual must have the background and knowledge to intelligently prepare the paper and treat the primary issues of concern and he should be the primary service representative on all matters having to do with the DCP. This "program advocate" should also be responsible for making the formal presentation at the initial DSARC review.

Upon completion of a draft DCP, it should be distributed simultaneously through JCS and the offices of the DSARC principals for review and comment. The reason for simultaneous distribution of the draft DCP is to reduce the time required for all parties to review and comment and also to give the Service more independent appraisals of the DCP than are presently obtained. This should result in a better balance of views because the comments of each reviewing official will be based upon the Service drafted DCP rather than the views and comments of other reviewers. The reviewing officials, rather than revising the DCP, should indicate their concurrence or dissent and their rationale therefor, on a single page which would become an appendix to the DCP. The DCP "advocate" would then consider the comments tendered by the reviewers and those he considers valid would be reflected in modifications to the DCP. Those comments

which the "advocate" considers not valid would be returned to the originator with comments supporting the decision for not including these items in the DCP. If resolution cannot be reached on these disputed issues prior to the DSARC, they should be carried forward into the DSARC as issues for discussion. If revised, the new DCP should be routed again for review.

Occasions have arisen in which the Project Manager of a particular program has been surprised at a DSARC by issues brought up for discussion which were not in the DCP. In the interest of saving time and getting on with the known issues, the DSARC chairman should limit the raising of issues not previously included in the DCP to those issues which are germane to the decision at hand. If an important new issue is raised which all parties are not equally prepared to discuss, then the DSARC should be adjourned until such time as the issue can be discussed with knowledge and understanding. If this "hard line" on what is to be discussed in a DSARC is not adhered to, the effectiveness of the DSARC could effectively be undermined by the raising of parochial interests or side issues or subjects which other members had accepted as settled or not of sufficient importance to be considered at the DSARC level.

4. The Joint Chiefs of Staff should participate more actively in the DCP/DSARC process, particularly in those interactions dealing with program initiation. Their involvement currently consists mainly of identifying threats and

military needs, a function they perform in support of the PPB system. Rather than having the Chairman of the JCS or his designated representative invited to attend the DSARC reviews, the Secretary of Defense should require attendance by three JCS representatives, specifying that each of these representatives be from a different Service Component, and capable of discussing in detail the need for the particular program before the DSARC. Major defense programs are too important to permit the JCS attendee at DSARC reviews to be only from the sponsoring service as has been the case historically resulting in an unintentional bias in favor of the program, simply by virtue of the fact that the representative has a predisposition in favor of his parent service.

Attendance at the DSARC by JCS members from sister services should tend to overcome this deficiency by broadening the perspective of the Council, and result in the consideration and discussion being at a national defense level, rather than on a more parochial Service level. It should also reduce the tendency of JCS to force a "common service position" despite circumstances which would not warrant this action. Strong justifiable differences concerning a program at the JCS level should certainly be brought to the attention of the Secretary of Defense for his consideration prior to his decision, and not be submerged in the guise of Service cooperation.

In conclusion, the authors believe that although the Defense System Acquisition procedures, as established by DODD 5000.1, have resulted in marked improvement in the early decision-making of a program, implementation of the aforementioned recommendations would contribute significantly toward further streamlining of the acquisition process.

APPENDIX A

THE DEPUTY SECRETARY OF DEFENSE
WASHINGTON, D.C., 20301

31 JUL 1969

MEMORANDUM FOR SECRETARY OF THE ARMY
SECRETARY OF THE NAVY
SECRETARY OF THE AIR FORCE

SUBJECT: Improvement in Weapon Systems Acquisition

At the outset of this Administration it became clear that there were many problems associated with weapon system acquisition and that this area needed improvement. At that time, however, I expressed the philosophy that I wanted a reasonable chance to survey the situation before taking action. I believe that we need to experiment with and try out in a limited manner new practices and procedures and then, based on experience gained, establish the required policies or make other necessary changes rather than making major policy and far-reaching decisions off the top of the head.

To study specific areas of system acquisition I established several panels of the IAC to help identify the prime problems that should be given priority attention. These panels have now given me their preliminary reports and I believe that some things are so clearly indicated that action can be started on them immediately. The problems associated with cost growth in systems acquisition fall in this category.

For example, from the statistics that have been prepared and which I have furnished the Congress, the largest single cause of cost growth is over-optimism in cost estimates for major weapon systems. This is true both on the part of the contractor and the Military Services. Much of this results from the tremendous competition for programs among contractors. It is also a product, within the Services, of competition between programs for limited financial resources. There are, of course, numerous other reasons. I believe that the best way to change this situation within industry is to impress firmly on Defense contractors the need for cost realism in their proposals and the fact that we will make this point a major factor to be considered in source selection. This in turn will require that we make a distinct improvement in our DOD cost estimating and validating capability, as well as insuring that this estimating capability is fully and effectively applied by the source

selection authority. I feel that within the Services this is an item to which you should give priority attention. I would therefore like within the very near future to discuss with each of you your proposed actions and program that you feel will improve the program cost estimating capability in your Service. In addition to the Service action there is also needed an independent OSD capability to validate these cost estimates.

In my recent reviews of the histories of a number of major programs, I have noted that another major contributor to cost growth consists of changes which we make in a program during both the development phase and the production phase. While I know there is a valid need for some changes, much improvement is possible in this area. Many of the changes of the type currently being made can be and must be avoided. This can be accomplished, in part, first by assuring that we do a better and more complete job of defining what we really need in a system before entering full-scale development and, second, by the vigorous review and elimination of the many "nice" or "desirable" features which so often creep into these systems as they proceed through development and production. I therefore am requesting that each of you take action in the area of the establishment of military requirements to assure that better system definition is in fact accomplished before programs are submitted to the Secretary of Defense for approval for full-scale development; that increased emphasis be given to the implementation of the recently established program for configuration management and control; and that no changes be approved without an accurate knowledge of the impact of the cost of the change on the total program cost.

My reviews have also indicated a third major reason for cost growth which is to some degree associated with the above two points. This is that we have not adequately identified the risks associated with major programs and in fact in most cases we have not done a thorough job in completing the prerequisites to contract definition which are currently called for. In our desire to enter into these programs we have often shortcut some of these prerequisites and have not adequately completed the advanced development necessary to reduce the major risk areas to the point where it will be manageable in full-scale development. This often results in the necessity, in the middle of a large development effort, of going back and accomplishing work that should have been done beforehand, with, of course, the accompanying disruption of schedule and increase in program cost. I would, therefore, like each of you to focus more attention on this matter and assure that; during concept formulation:

Areas of high technical risk are identified and fully considered;

Formal risk analysis on each program is made;

Summaries of these are made part of the back-up material for the program.

Although not directly associated with the cost growth aspect of weapon system acquisition, there are two other items which I think are clear enough and important enough to mention here.

The first item relates to the use of competitive prototypes in our acquisition process, as well as the use of brassboard or other design validation techniques which may not be competitive. I feel that we will benefit by increasing dependence on hardware demonstration and competition, with some corresponding reduction in dependence on paper analyses. This must be done with recognition of the differences in susceptibility of different types and sizes of systems to this treatment; however, I am convinced that there are distinct benefits to be gained by a judicious increase in our use of hardware in the weapons acquisition process.

The second item relates to what I consider to be a general deficiency in the amount of test and evaluation we perform on a developmental weapon system before we commit significant resources to production. While it is generally, in my opinion, a mistake to schedule a complete break between development and production commitment, we have tended to drift too far in the direction of concurrency, and this must be reversed.

I would like to have, at your early convenience, your comments on the way you plan to put into effect the matters of guidance I have discussed above. In reviewing your answers I will conclude whether further direction or policy expression is needed to accomplish the desired purposes.

David Packard

cc: DDR&E
ASD(I&L)
ASD(C)
ASD(SA)

APPENDIX B

July 13, 1971

NUMBER 5000.1

DDR&E

Department of Defense Directive

SUBJECT: Acquisition of Major Defense Systems

I. PURPOSE

This Directive establishes policy for major defense system acquisition in the Military Departments and Defense Agencies (referred to as DoD Components).

II. APPLICATION

This Directive applies to major programs, so designated by the Secretary of Defense/Deputy Secretary of Defense (referred to as SecDef). This designation shall consider (1) dollar value (programs which have an estimated RDT&E cost in excess of 50 million dollars, or an estimated Production cost in excess of 200 million dollars); (2) national urgency; (3) recommendations by DoD Component Heads or Office of Secretary of Defense (OSD) officials. In addition, the management principles in this Directive are applicable to all programs.

III. POLICY

A. Mode of Operation - Successful development, production and deployment of major defense systems are primarily dependent upon competent people, rational priorities and clearly defined responsibilities. Responsibility and authority for the acquisition of major defense systems shall be decentralized to the maximum practicable extent consistent with the urgency and importance of each program. The development and production of a major defense system shall be managed by a single individual (program manager) who shall have a charter which provides sufficient authority to accomplish recognized program objectives.

Layers of authority between the program manager and his Component Head shall be minimum. For programs involving two or more Components, the Component having dominant interest shall designate the program manager, and his charter shall be approved by the cognizant official within OSD. The assignment and tenure of program managers shall be a matter of concern to DoD Component Heads and shall reflect career incentives designed to attract, retain and reward competent personnel.

1. The DoD Components are responsible for identifying needs and defining, developing and producing systems to satisfy those needs. Component Heads are also responsible for contractor source selection unless otherwise specified by the SecDef on a specific program.

2. The OSD is responsible for (a) establishing acquisition policy, (b) assuring that major defense system programs are pursued in response to valid needs and (c) evaluating policy implementation on each approved program.

3. The OSD and DoD Components are responsible for program monitoring, but will place minimum demands for formal reporting on the program manager. Nonrecurring needs for information will be kept to a minimum and handled informally.

4. The SecDef will make the decisions which initiate program commitments or increase those commitments. He may redirect a program because of an actual or threatened breach of a program threshold stated in an approved Development Concept Paper (DCP). The DCP and the Defense Systems Acquisition Review Council (DSARC) will support the SecDef decision-making. These decisions will be reflected in the next submission of the Program Objective Memorandum (POM) by the DoD Component.

B. Conduct of Program - Because every program is different, successful program conduct requires that sound judgment be applied in using the management principles of this Directive. Underlying specific defense system developments is the need for a strong and usable technology base. This base will be maintained by conducting research and advanced technology effort independent of specific defense systems development. Advanced technology effort includes prototyping, preferably using small, efficient design teams and a minimum amount of documentation. The objective is to obtain significant advances in technology at minimum cost.

1. Program Initiation

   a. Early conceptual effort is normally conducted at the discretion of the DoD Component until such time as the DoD Component

determines that a major defense system program should be pursued. It is crucial that the right decisions be made during this conceptual effort; wrong decisions create problems not easily overcome later in the program. Therefore, each DoD Component will designate a single individual, such as the Assistant Secretary for R&D, to be responsible for conceptual efforts on new major programs.

b. The considerations which support the determination of the need for a system program, together with a plan for that program, will be documented in the DCP. The DCP will define program issues, including special logistics problems, program objectives, program plans, performance parameters, areas of major risk, system alternatives and acquisition strategy. The DCP will be prepared by the DoD Component, following an agreement between OSD and that Component on a DCP outline. The Director, Defense Research and Engineering (DDR&E)(or the Assistant Secretary of Defense (Telecommunications) for his programs) has the basic responsibility for coordination of inputs for the DCP and its submittal to the DSARC for consideration and to the SecDef for subsequent decision. If approved, the program will be conducted within the DCP thresholds.

2. Full-Scale Development. When the DoD Component is sufficiently confident that program worth and readiness warrant commitment of resources to full-scale development, it will request a SecDef decision to proceed. At that time, the DSARC will normally review program progress and suitability to enter this phase and will forward its recommendations to the SecDef for final decision. Such review will confirm (a) the need for the selected defense system in consideration of threat, system alternatives, special logistics needs, estimates of development costs, preliminary estimates of life cycle costs and potential benefits in context with overall DoD strategy and fiscal guidance; (b) that development risks have been identified and solutions are in hand; and (c) realism of the plan for full-scale development.

3. Production/Deployment. When the DoD Component is sufficiently confident that engineering is complete and that commitment of substantial resources to production and deployment is warranted, it will request a SecDef decision to proceed. At that time, the DSARC will again review program progress and suitability to enter substantial production/deployment and forward its recommendations to the SecDef for final decision. Such review will confirm (a) the need for producing the defense system in consideration of threat, estimated acquisition and ownership costs and potential benefits in context with overall DoD

strategy and fiscal guidance; (b) that a practical engineering design, with adequate consideration of production and logistics problems is complete; (c) that all previously identified technical uncertainties have been resolved and that operational suitability has been determined by test and evaluation; and (d) the realism of the plan for the remainder of the program. Some production funding for long lead material or effort may be required prior to the production decision. In such cases, the SecDef will decide whether a DSARC review and revised DCP are required. In any event, full production go-ahead will be authorized by approval of the DCP.

C. Program Considerations

1. System need shall be clearly stated in operational terms, with appropriate limits, and shall be challenged throughout the acquisition process. Statements of need/performance requirements shall be matched where possible with existing technology. Wherever feasible, operational needs shall be satisfied through use of existing military or commercial hardware. When need can be satisfied only through new development, the equivalent needs of the other DoD Components shall be considered to guard against unnecessary proliferation.

2. Cost parameters shall be established which consider the cost of acquisition and ownership; discrete cost elements (e.g., unit production cost, operating and support cost) shall be translated into "design to" requirements. System development shall be continuously evaluated against these requirements with the same rigor as that applied to technical requirements. Practical tradeoffs shall be made between system capability, cost and schedule. Traceability of estimates and costing factors, including those for economic escalation, shall be maintained.

3. Logistic support shall also be considered as a principal design parameter with the magnitude, scope and level of this effort in keeping with the program phase. Early development effort will consider only those parameters that are truly necessary to basic defense system design, e.g., those logistic problems that have significant impact on system readiness, capability or cost. Premature introduction of detailed operational support considerations is to be avoided.

4. Programs shall be structured and resources allocated to ensure that the demonstration of actual achievement of program objectives is the pacing function. Meaningful relationships between need, urgency,

risk and worth shall be thereby established. Schedules shall be subject to trade-off as much as any other program constraint. Schedules and funding profiles shall be structured to accommodate unforeseen problems and permit task accomplishment without unnecessary overlapping or concurrency.

5. Technical uncertainty shall be continually assessed. Progressive commitments of resources which incur program risk will be made only when confidence in program outcome is sufficiently high to warrant going ahead. Models, mock-ups and system hardware will be used to the greatest possible extent to increase confidence level.

6. Test and evaluation shall commence as early as possible. A determination of operational suitability, including logistic support requirements, will be made prior to large-scale production commitments, making use of the most realistic test environment possible and the best representation of the future operational system available. The results of this operational testing will be evaluated and presented to the DSARC at the time of the production decision.

7. Contract type shall be consistent with all program characteristics including risk. It is not possible to determine the precise production cost of a new complex defense system before it is developed; therefore, such systems will not be procured using the total package procurement concept or production options that are contractually priced in the development contract. Cost type prime and subcontracts are preferred where substantial development effort is involved. Letter contracts shall be minimized. When risk is reduced to the extent that realistic pricing can occur, fixed-price type contracts should be issued. Changes shall be limited to those that are necessary or offer significant benefit to the DoD. Where change orders are necessary, they shall be contractually priced or subject to an established ceiling before authorization, except in patently impractical cases.

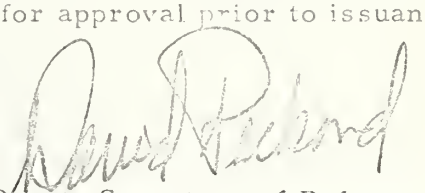
8. The source selection decision shall take into account the contractor's capability to develop a necessary defense system on a timely and cost-effective basis. The DoD Component shall have the option of deciding whether or not the contract will be completely negotiated before a program decision is made. Solicitation documents shall require contractor identification of uncertainties and specific proposals for their resolution. Solicitation and evaluation of proposals should be planned to minimize contractor expense. Proposals for cost-type or incentive contracts may be penalized during evaluation to the degree that the proposed cost is unrealistically low.

9. Management information/program control requirements shall provide information which is essential to effective management control. Such information should be generated from data actually utilized by contractor operating personnel and provided in summarized form for successively higher level management and monitoring requirements. A single, realistic work breakdown structure (WBS) shall be developed for each program to provide a consistent framework for (a) planning and assignment of responsibilities, (b) control and reporting of progress, and (c) establishing a data base for estimating the future cost of defense systems. Contractor management information/program control systems, and reports emanating therefrom, shall be utilized to the maximum extent practicable. Government imposed changes to contractor systems shall consist of only those necessary to satisfy established DoD-wide standards. Documentation shall be generated in the minimum amount to satisfy necessary and specific management needs.

IV. IMPLEMENTATION

1. Each DoD Component will implement this Directive within 90 days and forward two (2) copies of each implementing document to the SecDef.

2. The number of implementing documents will be minimized and necessary procedural guidance consolidated to the greatest extent possible. Selected subjects to be covered by DoD Directives/Instructions or joint Service/Agency documents in support of this Directive are listed in Enclosure 1. Each DoD Component will forward the joint Service/Agency documents for which it is responsible to the SecDef for approval prior to issuance.



Deputy Secretary of Defense

Enclosure
Related Policy

RELATED POLICY

Responsibility for the following policy documents is assigned to the Cognizant Office indicated. In each case, the Cognizant Office shall (a) generate the policy, or (b) delegate authority to a lead DoD Component for preparation and subsequent issue of a joint Service/ Agency regulation, agreement or guide after approval by OSD.

Policy Subject	Cognizant Office	Responsible DoD Component
The DoD Technology Base	DDR&E	
The DCP and the DSARC	DDR&E	
Defense System Engineering	DDR&E	Air Force
Proposal Evaluation and Source Selection	ASD(I&L)/ DDR&E	
Cost Analysis	ASD(SA)	
Acquisition of Data	ASD(I&L)	
Cost/Schedule Control Systems	ASD(C)	Air Force
Test and Evaluation	DDR&E	Navy
Priorities and Allocations	ASD(I&L)	
Manufacturing Technology	ASD(I&L)	
Quality Assurance	ASD(I&L)	
Logistic Support	ASD(I&L)	
Standardization	ASD(I&L)	
Value Engineering	ASD(I&L)	

THE DEPUTY SECRETARY OF DEFENSE
WASHINGTON, D. C. 20301

MAY 28, 1970

MEMORANDUM FOR Secretaries of the Military Departments
Director of Defense Research & Engineering
Assistant Secretaries of Defense
The General Counsel
Assistants to the Secretary of Defense
Directors of Defense Agencies

SUBJECT: Policy Guidance on Major Weapon System Acquisition

We have been considering within the Department, for over a year, ways by which we can improve acquisition programs for major weapon systems. Some steps have been taken which I believe are in the right direction (reference my July 31, 1969 memorandum), and it is now appropriate to move ahead in a concerted effort to firmly establish additional new policies and to implement them.

The prime objective of the new policy guidance is to enable the Services to improve their management of programs. Improvement in the execution of these programs will be made to the extent the Services are willing and able to improve their management practices. The Services have the responsibility to get the job done. It is imperative that they do the job better in the future than it has been done in the past.

It is the responsibility of the OSD to approve the policies which the Services are to follow, to evaluate the performance of the Services in implementing the approved policies and to make decisions on proceeding into the next phase in each major acquisition program.

The purpose of this memorandum is to issue broad policy guidance which is to be translated into appropriate action by all Services and Agencies in new major weapon system acquisitions.

Management

Management in the Services will be improved only to the extent that capable people with the right kind of experience and training are designated to manage these major programs -- in fact all programs. In order to be effective, program managers must be given adequate authority to make decisions on major questions relating to the program both in the conceptual development stage and in the full-scale development stage. If capable people are going to be willing to undertake these important program management assignments, ways must be found to give them some incentive to do so. Program managers must be given more recognition toward career advancement in all of the Services, and good managers must be rewarded just as good operational people are rewarded.

If our people are to develop the experience necessary for program management and are to utilize their experience, they must be assigned to a given program long enough to be effective.

The overall structure of the program management function in all Services needs to be considered. Changes must be made to minimize the numerous layers of authority between the program manager and the Service Secretary.

The entire management problem needs to be addressed under these simple guidelines: put more capable people into program management, give them the responsibility and the authority and keep them there long enough to get the job done right.

Development

The cost of developing and acquiring new weapon systems is more dependent upon making practical trade-offs between the stated operating requirements and engineering design than upon any other factor. This must be the key consideration at every step in development from the conceptual stage until the new weapon goes into the force.

The program schedule (structure) is another very key consideration. It must make sense. It must allow time for accomplishing important task objectives without unnecessary overlapping or concurrency. The ideal schedule is sequential with enough slack time for resolution of those problems which inevitably arise in any development program.

Conceptual Development

It is crucial that the right decisions be made during the conceptual stage. If wrong decisions are made during this period the problems that are generated cannot easily be overcome later in the program.

Any new program will contain some risk that the technology involved cannot, within reasonable time and cost constraints, be converted into practical engineering design which meets the desired operating requirements. There are three ways in which this technical risk can be minimized:

1. Risk Assessment. The first is to make a careful assessment of the technical problems involved and a judgment as to how much effort is likely to be necessary in finding a solution that is practical. A careful look at the consequence of failure, even of "low risk" program elements, is also critical.

2. System and Hardware Proofing. The second and only sure way to minimize the technical risk is to do enough actual engineering design and component testing in the conceptual development stage to demonstrate that the technical risks have been eliminated or reduced to a reasonable level. Component or complete system prototyping, or backup development, are examples of this.

3. Trade-offs (risk avoidance). Since program risk and cost are dependent on practical trade-offs between stated operating requirements and engineering design, trade-offs must be considered not only at the beginning of the program but continually throughout the development stage.

Proposals for OSD approval of development programs shall include a description of how the Service or Agency intends to manage the program to include appropriate attention to (1) Risk Assessment; (2) System and Hardware Proofing; (3) Tradeoffs. When a DCP is prepared, it shall reflect these in the management plan.

Small development projects which do not require specific OSD approval shall also be structured to reflect these considerations.

All new programs will be kept in the conceptual development stages until the responsible Service secretary and the OSD can be assured that the program is actually in the proper shape to proceed into full-scale development.

Full-Scale Development

Authorization to proceed into full-scale development will be given by OSD based upon a DCP and the recommendation of the DSARC. In making this recommendation, the DSARC shall consider in particular whether adequate risk reduction has been accomplished.

Even though risk has been adequately addressed during the conceptual development stages, full-scale development will uncover technical and engineering problems that need to be solved. Procedures shall be established in the development program by which these problems will be continually addressed in view of possible trade-offs with stated operating requirements, cost, and operational readiness date.

Furthermore, it is essential to have assurance that those problems encountered during the earlier development stages have in fact been solved. This requires that milestones be established to demonstrate achievement of objectives at appropriate points in the development program. These milestones shall include such things as completion of appropriate stages in the overall system design and testing of critical items of hardware, e.g., subsystems and components.

Consideration must be given in development to all matters necessary in a full operating system. This will include such things as maintenance, logistic support, training, etc. However, where these matters are dependent on the final production design, as much of this work as possible should be delayed until the production stage. In general, RFPs for the development stage should be carefully reviewed to eliminate demands for reports, documentation and work tasks which are not absolutely necessary for the efficient accomplishment of the actual development work. These considerations and demands must be limited to those which directly contribute to the design of the system itself.

Production

The most important consideration before moving into full-scale production on a new weapon system is to have assurance that the engineering design is completed, that all major problems have been resolved, and this has been demonstrated to the extent practical by actual performance testing.

At the DSARC review when the decision is made as to whether to proceed into full production, I want the responsible Service to certify that the following actions have been taken:

1. All of the milestones which demonstrate the achievement of a practical engineering design have been met.

2. All important engineering problems encountered during the development have been resolved with appropriate trade-offs with stated operating requirements so that the production, maintenance and operating costs are optimized.

The start up of production must be scheduled to minimize financial commitments until it has been demonstrated that all major development problems have been resolved. In most cases production engineering and production tooling are necessary to demonstrate that the engineering has been satisfactorily accomplished. It may also be necessary to develop and demonstrate new production processes, methods and procedures. Thus, some limited expenditure on production may have to overlap development.

Contracts

In all our contracting, the type of contract must be tailored to the risks involved. Cost plus incentive contracts are preferred for both advanced development and full scale development contracts for major systems. When the assessment of technical risk permits, such contracts should include provisions for competitive fixed price subcontracts for subsystems, components and materials. In many cases this will enable a major portion of the program to benefit from competition. When risks have been reduced to the extent that realistic pricing can take place, fixed-price type contracts should be used. But the contracting officer should have the flexibility to consider the technical capability of the contractor and other factors in selection of contract type. When fixed-price type contracts are used for development programs, the contractor's financial ability to absorb losses that might be incurred must be a factor in making the award.

It is, of course, desirable to award a fixed-price contract in a competitive environment. It has been proven to be difficult or impossible to achieve effective competition in a fixed-price contract for production for a major weapon system before full-scale development has been undertaken. Consideration should therefore be given to the use of a negotiated fixed-price contract after the development has progressed to the point that the production design can be realistically specified. To the extent possible, a contract negotiated under these circumstances should encourage competition for subsystems, components and materials. In this way a substantial part of the cost can be established in a competitive environment.

The use of letter contracts should be minimized. Change orders should not be authorized until they have been contractually priced, or until contractual ceilings have been established.

This guidance is provided to the Services with the understanding that it is to be implemented within the established DCP and DSARC policies. Other reports and reviews are to be kept to a minimum, but the lines of communication between OSD offices and Service components must be kept open to insure actual programs are being implemented under this guidance.

To the extent that the above guidance conflicts with existing DoD Directives and Instructions, the policies stated herein will govern. Since these policies should be applied immediately, I would appreciate your distributing this memorandum to key personnel, including all program managers, involved in the acquisition of major weapon systems.

I want the appropriate regulations of OSD and the Services and Agencies to be changed or cancelled to reflect these policies. I have asked the DDR&E to take the leadership in accomplishing this and have suggested 1 September 1970 as the date for recommending changes to me.

David Packard

APPENDIX C

THE DEPUTY SECRETARY OF DEFENSE
Washington, D.C., 20301

30 May 1969

(Copy)

MEMORANDUM FOR SECRETARIES OF THE MILITARY DEPARTMENTS
DIRECTOR, DEFENSE RESEARCH AND ENGINEERING
ASSISTANT SECRETARY OF DEFENSE (COMPTROLLER)
ASSISTANT SECRETARY OF DEFENSE
(INSTALLATIONS AND LOGISTICS)
ASSISTANT SECRETARY OF DEFENSE
(SYSTEMS ANALYSIS)

SUBJECT: Establishment of a Defense Systems Acquisition Review Council

I have been reviewing for some time current practices within the Department of Defense for the acquisition of major systems. My review has highlighted the importance of our organization and practices for accomplishing this management job. The primary responsibility for the acquisition and management of our major systems must rest with the individual Services. Within each Service, this responsibility is focused in the Project Manager. Recognizing the Service responsibility, I am, at the same time, most anxious of insuring, before we approve transitioning through the critical milestones of the acquisition of a major system, that all facets of the acquisition process are properly considered.

Toward this end, I am establishing a Defense Systems Acquisition Review Council (DSARC) within the Office, Secretary of Defense, to advise me of the status and readiness of each major system to proceed to the next phase of effort in its life cycle. The Council will serve to complement the Development Concept Paper (DCP) system, which continues as a formal DOD management and decision-making system for the acquisition of major systems. The Council will evaluate the status of each candidate system at three basic milestone points: First, when the sponsoring Service desires to initiate Contract Definition (or equivalent effort); second, when it is desired to go from Contract Definition to full scale development; and third, when it is desired to transition from development to production for Service deployment.

The functions of the Council are separate from and do not encompass the management reviews of major systems which I have previously requested and which are being conducted by

DDR&E with assistance from ASD(I&L) and ASD(Comp.). These reviews are focused on the management of the system whereas the DSARC reviews will cover all issues, program thresholds and other matters normally treated in DCP's. Also, the management reviews will normally be held only once on each major system; whereas the DSARC reviews, which are based on program milestones, will be normally conducted three or more times during the acquisition cycle of a particular system.

The membership of the Council will include DDR&E, ASD(I&L), ASD(C), and ASD(SA). For the first two milestone reviews, that is, prior to entry into contract definition and prior to entry into full scale development, the Council will be chaired by the DDR&E. For the third review, related to the transition from development to production, the Council will be chaired by the ASD(I&L).

I am initially defining major systems, which will be subject to Council reviews, to include (1) those for which Development Concept Papers are required; and (2) those specifically designated by me for review and evaluation. A tentative charter for the Council is attached as an enclosure. I desire that the DDR&E and ASD(I&L), within the next 30 days jointly prepare the necessary procedures and take the necessary administrative actions to implement the Council charter.

I believe the Council operation will result in improved management and will augment the decision-making process within the Department of Defense. I cannot over-emphasize the need for complete interface throughout the Department in the system acquisition process.

/s/ DAVID PACKARD

Enclosure
a/s

Charter

Defense System Acquisition Review Council

1. Purpose

This charter prescribes the mission, functions, composition, authority and responsibility, and administration of the Defense Systems Acquisition Review Council (DSARC).

2. Mission

The mission of the DSARC is to review major and important Department of Defense system acquisition programs at appropriate milestone points in their life cycle. These reviews are intended to permit coordinated evaluation and deliberation among senior managers, based on the most complete presentation of information available to assure that advice given the Secretary of Defense is as complete and objective as possible prior to a decision to proceed to the next step of the system's life cycle. The DSARC operation and evaluations will serve to complement the DCP system which remains as a formal DOD management and decision-making system concerning the acquisition process of major defense systems.

3. Functions

a. The DSARC will review and evaluate the status of each appropriate system acquisition program at three basic milestone points:

First: When initiation of Contract Definition (or equivalent effort) is proposed;

Second: When transition from the Contract Definition phase to full-scale development is proposed; and

Third: When transition from the development phase into production for Service deployment is proposed.

b. The first review will support the basic DCP in that it will provide a forum for discussion and possible resolution of the various viewpoints of the participating principals, including the Secretary of the

Military Service sponsoring the program. The later reviews will serve a function of validating the readiness of a system to proceed to the next stage, i.e., normally full-scale development or production.

4. Composition

The DSARC will consist of the DDR&E, the ASD(I&L), the ASD (Comptroller) and the ASD(SA).

5. Authority and Responsibilities

a. For consideration of entry into Contract Definition (Contract Definition Phase) and entry into full-scale development (the full-scale development phase), the DSARC will be chaired by the DDR&E.

b. For the transition from development to production (the production phase), the DSARC will be chaired by the ASD(I&L).

c. For additional reviews, the DSARC will be chaired by DDR&E or the ASD(I&L) as appropriate, depending on whether the action under consideration is concerned with movement within the full-scale development phase or into or within the production phase.

d. Reviews at points other than program transition points may be requested by a DSARC member by memorandum to the appropriate chairman.

e. Review of a program at any point in its life cycle may be directed by the Secretary of Defense or the Deputy Secretary of Defense.

f. Reviews will be limited to major and important programs. These are (1) those for which Development Concept Papers are required; and (2) those specifically designated for review by the Secretary of Defense, the Deputy Secretary of Defense or the appropriate DSARC chairman.

g. Aspects to be considered by the DSARC include, but are not limited to, the following:

(1) For items proposed for Contract Definition:

(a) Justification of military need;

(b) Validity of operational concept and objectives;

(c) Relative capability compared with present/ anticipated and with capabilities of other systems;

(d) Technical feasibility;

(e) Validity of cost estimates and analysis of cost risks involved;

(f) Validity of proposed scheduling and consideration of alternatives thereto;

(g) Validity of proposed procurement methodology, including type of contractor structure, kind of contract, timing of Government production commitment, means of assuring competition; and

(h) Validity of program manager plans, controls and organization.

(2) For items proposed for transition from Contract Definition into full-scale development:

(a) Continued validity of program objectives and validity of changes thereto since completion of concept formulation;

(b) Confidence in achieving current program objectives;

(c) Analysis of current risks;

(d) Technical feasibility, risks associated therewith and analysis thereof;

(e) Adequacy of integrated logistics support planning;

(f) Validity of cost estimates, including analysis of cost differences between competing Contract Definition contractors and Government estimates;

(g) Options associated with cost trade-offs and analysis thereof;

(h) Adequate consideration of contract incentives and inducement for competition; and

(i) Validity of contractor proposals.

(3) For systems proposed for initial production:

(a) Feasibility of production, including evaluation

of milestone achievements, test results and production line producibility;

(b) Technical feasibility, including specification requirements;

(c) Review and evaluate overall requirement;

(d) Current validity of cost estimates;

(e) Need, an appropriate, for concurrent development and production as well as validity of recommended time phasing of production/deployment aspects;

(f) Adequacy of integrated logistic support planning;

(g) The existence of adequate project management controls;

(h) Adequate planning for Government-furnished equipment and facilities; and

(i) Adequate planning as to proprietary rights items.

h. The Chairman may invite other staff members, such as the ASD(M&RA) and the ASD(ISA) to participate in the reviews when the reviews have significant relevance to their responsibilities.

i. The Chairman shall advise the Deputy Secretary of Defense of the findings and recommendations of the specific review and concurrently a copy of the findings and recommendations will be forwarded to the appropriate Service Secretary.

6. Administration

The DSARC may establish necessary Working Groups to assist the Council members in their reviews.

LIST OF REFERENCES

1. Department of Defense (Comptroller), The Economics of Defense Spending: A Look at the Realities, Government Printing Office, July 1972.

2. "Report to The President and the Secretary of Defense on the Department of Defense by the Blue Ribbon Defense Panel," Government Printing Office, July 1970.

3. Defense Weapon Systems Management, Industrial College of the Armed Forces, 1968.

4. New York Times, January 18, 1961.

5. Hitch, C.J. and McKean, R.N., The Economics of Defense in the Nuclear Age, Harvard University Press, 1960.

6. Defense Research and Development, Industrial College of the Armed Forces, 1966.

7. McNamara, R.S., "McNamara Defines His Job," New York Times Magazine, April 26, 1964.

8. "Statement of Secretary of Defense Robert S. McNamara before the Senate Armed Services Committee on Fiscal Year 1969-73 Defense Program and 1969 Defense Budget," Government Printing Office, 1968.

9. McNamara, R.S., "Managing the Department of Defense," Civil Service Journal, v. 4, April-June 1964.

10. Deputy Secretary of Defense Memorandum, "Improvement in Weapon Systems Acquisition," July 31, 1969.

11. Getler, M., "David Packard: Presiding Over a Revolution," Armed Forces Management, March 1970.

12. "Statement of Secretary of Defense Melvin R. Laird on the Fiscal Year 1972-76 Defense Program and the 1972 Defense Budget before the Senate Armed Services Committee," Government Printing Office, March 1971.

13. "Statement of Secretary of Defense Melvin R. Laird before the Senate Armed Services Committee on the Fiscal Year 1973 Defense Budget and Fiscal Year 1973-77 Program." Government Printing Office, February 1972.

14. Kline, M.B. and Lifson, M.W., Systems Engineering Lecture Notes, University of California, Los Angeles, April 1970.

15. Kline, M.B. and Lifson, M.W., "Systems Engineering," Chapter 2 in Cost Effectiveness, ed. by J.M. English, John Wiley and Sons, Inc., 1968.

16. Kline, M.B. and Lifson, M.W., "Systems Engineering and Its Application to the Design of an Engineering Curriculum," Journal of Systems Engineering, v. 2, no. 1, Summer 1971.

17. Department of the Navy RDT&E Management Guide, Government Printing Office, 1972.

18. "Supplemental Statement of Honorable Barry J. Shillito, Assistant Secretary of Defense (Installation and Logistics) before the Subcommittee on Economy in Government, Joint Economic Committee," Government Printing Office, June 1969.

19. Report of the Panel on R&D Management, Office of the Director of Defense Research and Engineering, July 1969.

20. "DCP-DOD's Anonymous Management Tool," Armed Forces Management, December 1968.

21. Deputy Secretary of Defense Memorandum, "Responsibilities in the Process of Acquiring Major Weapon Systems," 15 December 1969.

BIBLIOGRAPHY

Aerospace Studies Institute Project No. AU-420-63-ASI, Development of Organization for National Defense 1898-1960, Air University, Maxwell Air Force Base, May 1963.

Alchian, A.A., and others, A Commentary on Defense Management, Government Printing Office, 1969.

Aman, W.G. and others, Defense Research and Development, Government Printing Office, 1968.

Andrews, W., "Development Concept Papers for 80 DOD Projects in '68," Aerospace Technology, January 29, 1968.

Army Regulation Number AR 1000-1, "Basic Policies for Systems Acquisition by the Department of the Army," June 30, 1972.

Biadasz, F.E., Defense Reorganization During the Eisenhower Administration, Ph.D. Dissertation, Graduate School of Georgetown University, 1961.

Bobrow, D.B. and others, Weapons System Decisions, Frederick A. Praeger, 1969.

Comptroller General of the United States Report to the Congress B-163058, Acquisition of Major Weapon Systems, U.S. General Accounting Office, July 17, 1972.

"DCP-DOD's Anonymous Management Tool," Armed Forces Management, December 1968.

Department of Defense Directive 5000.1, "Acquisition of Major Defense Systems," July 13, 1971.

Department of the Navy RDT&E Management Guide, Part I: System Description, Government Printing Office, 1972.

de Poiz, V.P., "Concepts for Improving Defense Management," Defense Management Journal, v. VII, no. 1, Spring 1971.

Deputy Secretary of Defense Memorandum, "Establishment of a Defense Systems Acquisition Review Council," May 30, 1969.

Deputy Secretary of Defense Memorandum, "Improvement in Weapon Systems Acquisition," July 31, 1969.

Deputy Secretary of Defense Memorandum, "Responsibilities in the Process of Acquiring Major Weapon Systems," December 15, 1969.

Deputy Secretary of Defense Memorandum, "Policy Guidance on Major Weapon System Acquisition," May 28, 1970.

"DOD Concept Papers Offer Side Benefits," Aviation Week & Space Technology, March 10, 1969.

"DOD Technique Spurs Programs," Aviation Week & Space Technology, September 23, 1968.

Eberstadt, F., "Report to Hon. James Forrestal, Secretary of the Navy, on Unification of the War and Navy Departments and Postwar Organization for National Security," Government Printing Office, 1945.

The Economics of Defense Spending: A Look at the Realities, Government Printing Office, 1972.

Enthoven, A.C. and Smith, K.W., How Much is Enough, Harper & Row, 1971.

Foster, J.S., "Guidelines for Acquisition Management Gleaned from DOD's Systems Experience," Aerospace Management, v. 4, no. 2, Spring 1969.

Getler, M., "David Packard: Presiding Over a Revolution, Armed Forces Management, March 1970.

Hitch, C.J. and McKean, R.N., The Economics of Defense in the Nuclear Age, Harvard University Press, 1960.

Kline, M.B. and Lifson, M.W., "Systems Engineering," in Cost Effectiveness, ed. by J.M. English, John Wiley and Sons, Inc., 1968.

Kline, M.B. and Lifson, M.W., "Systems Engineering and Its Application to the Design of An Engineering Curriculum," Journal of Systems Engineering, v. 2, no. 2, Winter 1971.

Kline, M.B. and Lifson, M.W., Systems Engineering Lecture Notes, University of California, Los Angeles, April 1970.

Logistics Management Institute Task 72-6, The Program Manager Authority and Responsibilities, August 1972.

"Management in the Defense Department," Defense Industrial Bulletin, April 1970.

McNamara, R.W., "McNamara Defines His Job," New York Times Magazine, April 26, 1964.

McNamara, R.S., "Managing the Department of Defense," Civil Service Journal, v. 4, April-June 1964.

McNamara, R.S. and others, A Modern Design for Defense Decision, Government Printing Office, 1969.

Mills, W. (editor), The Forrestal Diaries, Viking Press, 1951.

Naval Material Command Memorandum, "Policy Guidance on Major Weapons Systems Procurement," May 14, 1970.

Navy Research, Development, Test & Evaluation Program, Naval Material Command, March 1972.

New York Times, January 18, 1961.

Packard, D., "Improving R&D Management Through Prototyping," Defense Management Journal, July 1972.

Peck, M.J. and Scherer, F.M., The Weapons Acquisition Process: An Economic Analysis, Harvard University Press, 1962.

"Proceedings of Symposium on Major Defense Systems Acquisition," Washington, D.C., August 1971.

"Promises and Problems," Armed Forces Management, April 1970.

Reich, E.T., "Ailments and Therapy in - The Process for Acquiring Major Weapons Systems," Defense Management Journal, v. VII, no. 1, Spring 1971.

Report of the Panel on R&D Management, Office of the Director of Defense Research and Engineering, July 1969.

"Report to the President and the Secretary of Defense on the Department of Defense by the Blue Ribbon Defense Panel," Government Printing Office, July 1970.

Reis, J.D., The Management of Defense, Johns Hopkins Press, 1964.

Schlesinger, J.R., Defense Planning and Budgeting: The Issue of Centralized Control, Government Printing Office, 1968.

Secretary of the Navy Instruction 5000.1, "System Acquisition in the Department of the Navy," March 13, 1972.

Senate Hearings Before the Committee on Appropriations, Department of Defense Appropriations Fiscal Year 1973, Government Printing Office, 1972.

Shillito, B.J., "Management of Major Weapon System Acquisition," Defense Industry Bulletin, January 1970.

Shillito, B.J., "Supplemental Statement of Honorable Barry J. Shillito, Assistant Secretary of Defense (Installation and Logistics) before the Subcommittee on Economy in Government, Joint Economic Committee," Government Printing Office, June 11, 1969.

"Statement of Mr. David Packard, Deputy Secretary of Defense, before the Military Operations Subcommittee, Committee on Government Operations, House of Representatives," Government Printing Office, September 22, 1970.

"Statement of Secretary of Defense Melvin R. Laird before the Senate Armed Services Committee on the Fiscal Year 1972-76 Defense Program and the 1972 Defense Budget," Government Printing Office, March 15, 1971.

"Statement of the Secretary of Defense Melvin R Laird before the Senate Armed Services Committee on the Fiscal Year 1973 Defense Budget and Fiscal Year 1973-77 Program," Government Printing Office, February 15, 1972.

"Statement of Secretary of Defense Robert S. McNamara before the Senate Armed Services Committee on the Fiscal Year 1969-73 Defense Program and 1969 Defense Budget," Government Printing Office, 1968.

Strohlein, J., Defense Weapon Systems Management, Government Printing Office, 1968.

U.S. General Accounting Office Report B-164912, "Observations on the Planning of Research and Exploratory Development," General Accounting Office, October 4, 1972.

Weapons Systems Acquisition Process (Parts 1 through 5), Hearings before the Committee on Armed Services, U.S. Senate, Government Printing Office, 1972.

"What's a DCP?" Government Executive, October 1972.

Winston, D.C., "Firms to See Development Concept Papers," Aviation Week & Space Technology, January 29, 1968.

Yarmloinsky, A., The Military Establishment, Harper & Row, 1971.

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13. ABSTRACT

The acquisition of major defense systems has become a matter of concern to the Congress of the United States and in the eyes of the nation's populace as a whole.

As in any major research and development effort, both in the Department of Defense and in civilian industry, early planning and sound decision-making at the inception of a program are key to the future success of the program.

The responsibilities and roles of the Service Components and the Office of the Secretary of Defense in the initiation of defense system acquisition must be clearly defined and well coordinated if the early planning and decision-making are to be sound and effective. Current DOD policies are tending toward clearer definition of these responsibilities and roles, but there are still improvements which should be made.

This thesis reviews the history of management of defense system acquisition, presents the current procedures and practices employed in program initiation, and concludes with specific suggestions for streamlining certain aspects of the system acquisition process which pertain to the initiation of a major defense system.

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